AN APPROPRIATE CONCEPTUAL SUPPLY CHAIN MANAGEMENT MODEL IN THE TANZANIAN AGRICULTURAL SECTOR – A CASE STUDY OF COFFEE IN THE KAGERA REGION

by

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Submitted in accordance with the requirements
for the Degree of

DOCTOR OF BUSINESS LEADERSHIP

of the

UNIVERSITY OF SOUTH AFRICA

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DECEMBER, 2015

DECLARATION

Student number: **7276-084-2**

I declare that **AN APPROPRIATE CONCEPTUAL SUPPLY CHAIN MANAGEMENT MODEL IN THE TANZANIAN AGRICULTURAL SECTOR - A CASE STUDY OF COFFEE IN THE KAGERA REGION** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

SIGNATURE
(Mr J B B Bagonza)

30TH MAY 2016
DATE

DEDICATION

This research work is dedicated to my wife **Praxeda Kokwijuka Bagonza and my** daughters **Sylivia Kemilembe Bagonza** and **Winner Kagemulo Bagonza**.
They displayed remarkable patience during my absence for pursuing this study. They were a source of encouragement throughout the period of my study. May their world be more lovingly and honestly managed.

ACKNOWLEDGEMENT

"If we see further, it's because we stand upon the shoulders of the giants"
Sir Isaac Newton

The accomplishment of this study is the result of an assortment of materials, ideas, views and support from individuals, organisations and other sources. Every researcher owes a great deal to others and I am no exceptional. I wish to express my sincere gratitude to those who offered their valuable support and collegiality.

First and foremost, I wish to acknowledge and recognise the untiring efforts and guidance of my Major Research Supervisor Prof. P.D.M. Rwelamila for his constructive criticisms and comments which were extremely helpful for the accomplishment of this noble PhD research work in my life. I would like to recognise the great support I received from Lake Victoria Environmental Management Project–Phase Two (LVEMP II) through Mr. Omar Myanza, the Project Coordinator, for financing part of this research work. I equally received valuable support from Alhaj. Said Ali Mwema, the then Inspector General of Police -Tanzania and Mr. Clowding Mtweve, the then Commissioner of Police-Finance and Logistics. I really appreciate their support.

In getting started in my academic career, let me not forget the help, encouragement and scholarly values I received from Prof. Faustine Kamuzora, the Deputy Vice Chancellor at Mzumbe University and Dr. S. B Likwelile, the Permanent Secretary, Ministry of Finance, Tanzania. The same should go to other technical and professional colleagues at the Economic and Social Research Foundation including Dr. Hoseana Bohela Lunogelo, and Mr. John Kajiba the ICT Specialist and Mr. Ernest Laiton, Finance Management Officer at the Ministry of Finance, Tanzania. In the same vein, I wish to eloquently express my special appreciation to X-Kishoju Secondary School group (Jamvi group) for its great companion throughout my study.

I am grateful for the assistance I received from the management and staff of the UNISA Graduate School of Business Leadership (SBL) especially Prof. A. A. Okharedia, Academic Director and Dr. Ozias Ncube, A Senior Lecturer at SBL. I cannot forget the endless support I received from Madam Tumi Seopa, the DBL Programme Administrator, Ms. Mergan, Library Technician and all staff of the Finance section and other personnel. In the same tone, I am indebted to Dr. Albina Chuwa, the Director General of the National Bureau of Statistics for for her marvellous support as well as insights and counsel. Let me humbly express special gratitude to my parents Omugurusi Ta. Benjamin Bagonza and Omugurusikazi Ma. Dorothea Kagemulo Bagonza for their parental blessing.

Above all, I am grateful, deeply appreciative and dedicated this research work to my wife Praxeda Kokwijuka Bagonza, my only two daughters Sylvia Kemilembe Bagonza and Winner Kagemulo Bagonza for their moral and material support I received from them. I understand they missed me for taking long time with computer work and while away from home. I will never forget their forbearance. Anybody contributed to this study and is not mentioned, should consider himself/herself implicitly impliedly in this acknowledgement. I find it difficult to get appropriate phraseology to express my sincere gratitude to all of them. Although this research work involved so many people and professionals, I remain solely responsible for any mistakes, additions, omissions and views contained in this Thesis.

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LIST OF ABBREVIATIONS/ACRONYMS

ASDP	Agricultural Sector Development Programme
ASDS	Agricultural Sector Development Strategy
BCU	Bukoba Co-operative Union
BUKOP	Bukoba Coffee Curing Plant Limited
BoT	Bank of Tanzania
CEOs	Chief Executive Officers
CM	Chain Management
CIMMYT	International Maize and Wheat Improvement Centre
CNS	Chain Network Sciences
CRDB	Co-operative and Rural Development Bank
CRP	Capacity Requirement Planning
DCs	Distribution Centres
DFM	Data flow modeling
DOE	Design of Experiments
DSDM	Dynamic Systems Development Method
EC	European Commission
EEC	European Economic Community
EPC	Event-driven Process Chain
ERDs	entity-relationship diagrams, ER diagrams, or
ERM	entity-relationship model
ESRF	Economic and Social Research Foundation
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FEDECOP	Rural Coffee Farmers Savings and Credit Organisation
GCC	Global Coffee Chain
GDP	Gross Domestic Product
ICA	International Coffee Agreement
ICO	International Coffee Organization
ICT	Information Communication Technology
IDA	International Development Association
IFAD	International Fund for Agriculture Development
IRA	Information Requirements Analysis
IRB	Institutional Review Board
IRRI	International Rice Research Institute
JAD	Joint Application Design
KCU	Kagera Co-operative Union
KDCU	Karagwe District Co-operative Union
MAFS	Ministry of Agriculture and Food Security
MoFEA	Ministry of Finance and Economic Affairs
MPS	Master Production Schedule
MTEF	Medium Term Expenditure Framework

NACO	National Agricultural Company
NAFCO	National Agricultural and Food Corporation
NBS	Tanzania National Bureau of Statistics
NIE	New Institutional Economics
NMC	National Milling Corporation
OECD	Organisation for Economic Cooperation and Development
ORM	Object Role Modeling
PRS	Poverty Reduction Strategy
RAD	Rapid Application Development
RCCP	Rough-Cut Capacity Planning
RDS	Rural Development Strategy
REPOA	Research on Poverty Alleviation
RSCP	Rough-Cut Supply Chain Capacity Planning
SBL	School of Business Leadership
SCM	Supply Chain Management
SCMM	Supply Chain Management Model
SCRP	Supply Chain Capacity Requirement Planning
SIDP	Sustainable Industrial Development Policy
SPSS	Statistical Package for the Social Science
SRS	Simple Random Sample
SSM	Soft systems methodology
SUA	Sokoine University of Agriculture
TANICA	Tanganyika Instant Coffee Company Ltd
TBS	Tanzania Bureau of Standards
TCB	Tanzania Coffee Board
TCGA	Tanzania Coffee Growers Association
TCMB	Tanzania Coffee Marketing Board
TDV	Tanzania Development Vision
TIB	Tanzania Investment Bank
TTCL	Tanzania Telecommunications Company Ltd
UDSM	University of Dar es Salaam
UML	Unified Modeling Language
UN	United Nations
UNISA	University of South Africa
URT	United Republic of Tanzania
USD	United Stated Dollar
VCM	Value Chain Management
WW II	Second World War

ABSTRACT

Tanzania's good climatic condition of four agro-ecological zones and six farming system together with adequate good soils and water resources with reasonable rainfall patterns (except in semi-arid regions) are favourable for agricultural production. Despite this abundance of resources, Tanzania is still far from taping full potentials in crop production and productivity that could be attained if the existing agricultural resources were fully utilised. The agricultural sector has failed toraise the rural poor above the poverty line and has perpetuated the existing pervasive poverty among farming communities. These constraints facing the agricultural sector have contributed to low production and productivity of the agricultural sector. For several decades the agricultural sector has failed to fulfil its role as the "engine of economic growth"; as a result, the general picture of the Tanzania's economy has remained untransformed and unreliable. Given the importance of agriculture as the mainstay of rural livelihoods, it must grow much faster to realise rural poverty reduction in Tanzania.

In view of the above state of affairs, this study posed the following research questions: Are support activities and services in coffee production, processing and marketing significantly linked to allow application of Supply Chain Management (SCM)?; Do institutions responsible for coffee provide mandatory services to enable farmers undertake support activities and services in production, processing and marketing of this crop? Finally, are the coffee marketing support activities and services significantly integrated along the supply chain in order to enhance its marketing? Thus, the above underlined challenges and questions imply thatstagnation in agricultural development is a function of a multiplicity of soci-economic, technological and political factors. As a result, the call for improving the agricultural sector production and productivity needs a holistic approach, particularly the application of SCM. The above fact suggests that Tanzania should among others, find ways to increase agricultural production, productivity, promote agro-processing and expand markets for its agri-products through a well co-coordinated system. The present study calls for a collaborative and integrative approach in the supply chain to plan and control the flow of value adding materials from the producers to the consumers. The objective of this study is to examine the application of the Conceptual Supply Chain Management Model (SCMM) in coffee support activities and services in the areas of production, processing and marketing in order to suggest an appropriate model that can improve production and productivity of the agricultural sector thereby enhancing the income of the rural poor and ultimately alleviating poverty and raising the standard of living of Tanzanians.

Following the format prescribed by the University of South Africa, this thesis is organized into eight chapters. Also, it is structured in a coherent manner to bring the logic for the development of the conceptual framework for the coffee subsector in Kagera region. Chapter One provides the introduction and background information. It creates a base and sets a framework for the entire study. Chapter Two presents the literature review including both the theory and practice of SCM. It also presents the background and SCM development as well as the importance of integrating SCM in the agricultural sector in Kagera, Tanzania and the world at large. The objective of the chapter is to present an in-depth review of literature and show the gap so as to make justification for proposing a study on the application of the SCM in agriculture with reference to Coffee in Kagera Region. Chapter Three discusses the Model Development. It discusses the meaning and the type of conceptual models. Further more, it discusses the reasons for and the advantage of applying the conceptual models. Finally, it highlights the rationale for selecting a particular criterion for evaluating the conceptual models.

Chapter Four presents research methodology including identification of the definition of research and different research methods and their respective instruments for undertaking this study. It presents the theoretical and research process, showing the types of research methods and research designs. It also

presents in detail, sampling, sampling techniques and data collection techniques. Finally, the chapter highlights how the collected data have been organised, analysed and presented. Chapter Five is about research findings. It covers the outcome of the exercise set by Chapter Four. It presents descriptive and empirical information of basic agricultural support activities along the supply chain from production through consumption. It involves the analysis of the production, processing and marketing support activities to examine their influence on the production and productivity of coffee in Kagera Region. Chapter Six entails synthesis analysis and results. This is an amalgamation of the research findings as well as synthesis, descriptive and empirical analysis of those findings. Thus, the chapter is about the analysis of coffee production, processing and marketing support activities and services in Kagera Region.

Chapter Seven describes the contribution to knowledge which shows the existing conceptual SCMM for coffee in Kagera. The Chapter presents the appropriate conceptual model which adopts planning of many components in the coffee supply chain such as suppliers, materials, resources, warehouses, transporters and customers. The Model has been developed and proposed for application in Kagera Region in order to address the shortcomings addressed in the analysis made in the existing model as indicated in Chapter Six. Chapter Eight presents the summary, conclusions and recommendations. In this chapter, the study concludes that coffee marketing support activities and services in Kagera are not significantly linked to production and processing in order to allow the application of SCM principles. Furthermore, it shows that coffee management institutions such as private coffee traders, cooperative unions, government regional and district agricultural offices and other stakeholders do not provide all mandatory services to enable coffee production, processing and marketing support activities and services. According to this study, marketing support services are not significantly integrated in the coffee supply chain that will enhance its marketing.

Given this reality, this study proposes the adoption of the appropriate conceptual SCMM. The Coffee SCMM has been developed to coordinate key players and processes in coffee SCM for the integrated framework. The proposed model has been successfully implemented in many successful management systems. The conceptual model for Kagera integrates various participants involved in the entire coffee supply chain including coffee producers, processors and exporters. The Tanzania Coffee Board (TCB) is proposed to be the overall coordinator of the entire coffee supply chain. In addition, it proposes an information exchange procedure among players (feedback) initiated by consumers. For further studies, the study recommends three major blocks of studies such as support activities and services in the areas of SCM in coffee production, processing and marketing. Finally, the study proposes these three major areas to be individually and deeply studied.

CHAPTER ONE

INTRODUCTION AND BACKGROUND INFORMATION

1.1 Introduction

Tanzania's good climatic condition of four agro-ecological zones and six farming systems together with adequate good soils and water resources with reasonable rainfall patterns (except in semi-arid regions) are favourable for agricultural production of both food and cash crops. However, URT (2010) reveals that despite this abundance of resources, Tanzania is still far from achieving full potentials in the crop production and productivity that could be attained if the existing agricultural resources were fully utilised. The URT (2011) observes that the agricultural sector has failed to raise a sufficient number of the rural poor above the poverty line and has perpetuated the existing pervasive poverty among farming communities. Given the importance of agriculture as the mainstay of rural livelihoods, it must grow much faster to realise rural poverty reduction in Tanzania.

Report by IFAD (2012c) indicates that agricultural practices in Tanzania employ inadequate and un-coordinated factors of production, thus suggesting inadequate coordination of supply chain actors or economic actors. The end results of this situation include low production and productivity whereas post-harvest losses ranges between 30 and 40 percent. The private sector which was intended to take over the management of modern agriculture is still on its infancy and lacks the know-how and resources to execute them.It should be noted that the references cited in this research work are from international organisations such as the World Bank, Food and Agriculture Organisation of the United Nations (FAO) and International Fund for Agriculture Development (IFAD) and are relatively old. The underlying reason for using these materials are first, the need to address the Tanzanian agriculture very well and second, these papers were presented at specific conferences which are onetime events that do not take place regularly.

Meanwhile FAO (2015) and MAFSC (2015) show that the performance of the agricultural sector in Tanzania has been dismal over the past twenty years, its Gross Domestic Product (GDP) has been growing at 3.5 percent per year compared to the population which has been growing at the rate of about 2.8 percent. The agricultural sector has been largely managed by smallholder farmers who cultivate between 0.5 and 3.0 hectares annually (Mligo, 2014). Food crops such as maize, rice and cassava have been growing at 3.5 percent and export crops such as tobacco, coffee, cotton, tea and sisal have been growing at 5.4 percent per year (URT, 2012a, MoF, 2009 and URT, 2015). However, this study recognises that some of the references

used throughout this study are eight to ten years old. These materials are still in use and have never been replaced such as Tanzania Development Vision (TDV) 1999, Agricultural and Livestock Policy 1997, and the Agricultural Sector Development Strategy (ASDS) 2011. A recent revelation by the Government of Tanzania (Ministry of Agriculture and Food Security, 2015) is of concern:

> "Agriculture is the mainstay of the Tanzanian economy in terms of production, employment, income and foreign exchange generation. The agricultural sector is not growing at significant rates to meet the national targets, especially in the production of sufficient food surplus and cash crops for export. The sector's productivity is very low and uncompetitive with other countries in both food and cash crops. Since about 80 percent of the country's population depend on agriculture, low productivity in this sector calls more research, extension services and technology (agro-mechanisation)".

According to the MoFEA (2010a), this phenomenon explains the fact that the sector cannot fulfil its role as the "engine of economic growth" for poverty reduction and food security. Thus, due to such low performance of this crucial sector, the general picture of the Tanzania' economy has remained untransformed and unreliable (URT, 2014). As a result, the World Bank recommended an overall GDP growth rate of above single digit in order to reduce the abject poverty by 50% in 2025 (URT, 2015). However, in recent years the GDP has been in a range of six to seven percent. This implies difficulty in attaining the 2025 target. In view of URT (2014) and URT (2015), the constraints facing the agricultural sector include:

a) Production
   i. Volatile institutional arrangements and government policies on crop production;
   ii. Continuous reliance on the smallholder peasantry with poor technology (including the use of hand hoe);
   iii. Decline in the use of improved packages such as seeds, fertilizers, agro-chemicals and irrigation facilities;
   iv. Inadequate access to and delayed delivery of inputs and lack of timely extension services; and
   v. Inadequate input credit and guarantee facilities for agricultural production activities (poor financial services).

b) Processing
   i. Existence of small and medium agro-processing industries and factories only;
   ii. Lack of product specifications, including lack of standardization and appropriacy; and
   iii. Failure of financial institutions to grant long and short-term credits to private companies engaged in small scale agro industries.

c) Marketing
   i. Inadequate market information coupled with volatile international markets resulting in quality deterioration and huge post-harvest losses;
   ii. Weak management of agricultural crop marketing boards and co-operative unions resulting in their failure to negotiate for better prices of their agricultural products;

iii. Poor infrastructure for marketing facilities such as roads, storage facilities and telecommunication, poor logistics organization and narrow market for agricultural products;
iv. Inadequate participation of the private sector in marketing policy formulation, owing and running agricultural marketing service; and
v. Unfavourable fiscal policies and restrictions on crop movement that result in multiple taxation.

The Ministry of Finance (2012) reports that much of the government economic resources are directed to the areas that cannot foster crop production, facilitate marketing and create an attractive environment for agro-processing industries. The withdraw of subsidised marketing services for food crops and poor infrastructure has led to market failure in food crops consequently resulting in food insecurity. For example, the potential maize growing regions of Rukwa and Ruvuma are poorly accessible to food market areas in the country because roads or logistics corridors linking them to the rest of the country are in a pathetic condition that leads to market failure in these remote regions (Karumuna, 2012).

According to URT (2009) report, the available domestic resources have not been adequately mobilised and effectively utilised to promote a robust and sustainable agricultural sector development. This low level of productivity reflects a low degree of creativity and innovativeness, including the low level of utilization of science and technology. As URT (2012b) shows, the agricultural sector has been dominated by primary production making the economy vulnerable to changes in the international market place. For instance, Tanzania exports either semi or unprocessed agricultural products byexporting raw coffee that only undergoes primary processing done by local traders at curing factories for removing pulp. This means that about 99 percent of coffee in Kagera does not undergo secondary processing to add value to it while only one percent is processed by Tanganyika Instant Coffee Company Ltd (TANICA) for local consumption. This implies that there is inadequate co-ordination of agricultural activities. That is, there is lack of SCM principles within the sector.

The above underlined challenges imply that stagnation in agricultural development is a function of a multiplicity of social, economic, technological and political factors (Kauzeni, 2009). As a result, the intention to improve the agricultural sector production and productivity needs a holistic approach such as the application of SCM strategies, among others. The above literature suggests that Tanzania should, among others, find ways to increase agricultural production and productivity promote agro-processing and expand markets for its products through a well co-coordinated system. This calls for a collaborative and integrative approach in the supply chain to plan and control the flow of value adding materials from the producers to the ultimate consumers. In order to integrate these factors and achieve a balanced combination, a country has to adopt SCM principles. Developing the agricultural sector through a well co-coordinated SCM must be a pre-requisite for the overall

development of a country to ensure availability, accessibility and stability of supply of food and other physical and economic materials. This can be accomplished by breaking down the barriers existing between each of the links in the supply chain (Doyer, 2012).

According to Trienekens et al. (2010), SCM can considerably redesign products streamlining production, distribution and exchange of information. This is because SCM as a strategy must ensure that agriculture responds successfully to consumer demands (Van Roekel, 2007). For many countries, SCM in agriculture remains one of the viable ways of promoting economic growth (Trienekens et al., 2010). For the Tanzania's case, SCM can be an important link between producers and consumers in a market economy adopted by this country since the 1980's. Adopting the best SCM practices may effectively support agricultural productivity, ensuring efficient agro-processing, efficient market solution for agricultural products, and stimulate enterprise specialization.

Coffee, the Tanzania's largest traditional export crop, is among the leading source of foreign exchange (earning about 115 million US Dollars annually), thus becoming one of the dependable pillars of the country's economy (URT, 2009). Nevertheless, the Tanzania coffee sub-sector is highly dependent on international prices and is affected by the structure and workings of the world coffee market. In this context, this study seeks to identify what can be done in Tanzania through SCM to improve the performance of the agricultural crop sub-sector to yield benefits for the government and the estimated 400,000 families dependent on coffee production. Despite having much room for manoeuvre, Tanzania has not yet fully exploited its position in terms of production and productivity as one of the large producers of coffee in the world. FAO and MAFSC (2014) indicate that although the area under coffee has doubled during the last 20 years, total production has essentially remained stagnant at about 50,000 tonnes annually. A number of competitive advantages, including the development of the proper SCMM, may still be seized if quality and consistency are guaranteed. In order to maximize this potential, a critical analysis and intervention in the sector are important; and a number of recommendations are suggested.

Therefore, this study addresses the question, "to what extent is non-application of SCM by coffee management institutions in coordinating production, processing and marketing institutions activities and services associated with low production and productivity in the agricultural sector with a focus on coffee?" Based on available statistics and evidences, this study found that in Tanzania, little has been put in place to employ the SCM strategies to harness the available resources for increased agricultural production and productivity to enhance

the incomes and living standards of its people. Thus, this study has developed and proposed an appropriate conceptual coffee SCMM for Kagera Region.

1.2 Theory and Practice of Supply Chain Management

This research work reviewed both theoretical and empirical literature on SCM; literature on economics and agricultural economics, marketing and agribusiness. This section presented the conceptual framework and various definitions of SCM as proposed by different scholars. It focused on establishing an overview of this main topic and all dimensions involved in the SCM and their application in the production, processing and marketing of agricultural produce. Other sections illustrated Chain Science as an autonomous science discipline within the scientific approaches to the chain phenomenon. The section also explored emerging types of co-ordinating mechanisms of chain structures that are set to improve the co-ordination and operations in agricultural supply chains were also. Thus, this study indicates how an effective SCM has the potentials to improve the competitive position of agricultural sector products.

1.2.1 Supply Chain Management Defined

Downey (2006) observes that SCM is a way of increasing efficiency, effectiveness and profitability through a greater market co-ordination. He defines SCM in agribusiness as the process of bringing order to the system of producing, processing, distributing and marketing of food and agricultural products to consumers. From the consumer or public point of view according to him, SCM focuses on improving the efficiency and effectiveness of the system to deliver a wide selection of safe and desirable agricultural products in a cost-effective manner. Regarding the supplier's perspective, Tienekens and Zuurbier (2012) argue that SCM involves creating organisation structures and linkages that will insure a strong position in the market and enhance their ability to generate healthy profits for their equity holders. In aggregate, one will find that both customers and suppliers view the word "chain" as a "system or network of entities that are linked together". Therefore, it attempts to elucidate the system of linkages and interactions in the production or manufacturing, processing, distribution and marketing of food and agri products.

The development of SCM starts with the term Chain Management (CM). The available literature provides a variety of definitions of CM depending on the kind of problems addressed or someone would like to solve or the focus of scientific discipline chosen by the researcher. Different aspects of CM are explored in the agricultural industry with the goal of getting an overview of all the dimensions involved in CM that have to be

considered and their application in the marketing of agricultural produce. These dimensions represent the activities, processes and exchange between participants in the agricultural chains that have to be facilitated by the CM structures. CM delivers the required product to the consumer and, therefore, plays an important role in value creation. In the framework of analysis, the drivers of change determine chain strategy and the required output of the chain. The supply chain processes shape the required characteristics of the transactions between the participants to facilitate value creation. Various definitions of CM are presented and discussed as follows:

Beers et al. (2008) define CM as the series of entities that is managed or co-ordinated together in order to achieve better customer value with improved revenues at lower costs while satisfying a variety of constraints. That means that CM co-ordinates successive stages from primary producer to end consumer. Essentially, CM is an integrative approach dealing with planning and control of material flow from supplier to end user. Therefore, CM seeks to break down barriers which exist between each of the links in order to achieve higher levels of service and substantial savings in costs. Moreover, it seeks to bring about relationship of mutual benefit by defining organisational structures and contractual relationship between buyer and seller in which all parties are well off. Generally, CM is the system whose constituent parts include material supplier, production facilities, distribution services and customers linked together via the flows of materials and financial information.

Beers, Beulens and Van Dalen (2007) observe that SCM is an off-spring of Chain Science and regard chain science similar to any other sciences with its own set of theoretical propositions, its own domain and its own methodology. They define CM from institutional point of view as the linkages between the actors. They believe that a product is created by a set of activities with precedence relations between them executed and directed by organisations within the production chain. They further believe that the way these activities are organised, managed and controlled among several actors is the focus of institutional approach. Therefore, to them CM from an institutional perspective deals with the interaction between organisations in the chain on the way contracts are negotiated and managed, pricing process, exchange information, co-ordination and control of physical flows. Focusing on the process perspective of chain, they perceive CM by considering the variety, volume and spatial distribution of products and production activities.

Three important aspects are worth noting when discussing CM or simply supply chain. The use of term ‘chain’ seems to be an oversimplification of the nature of the supply chain process. The term ‘chain’ creates an

impression that a supply chain is a linear and rigid arrangement of firms serving the final consumer. Therefore, SCM in its real sense refers to a system or network of firms interacting to deliver a product or service of superior value to the end consumer (Ellram, 2001; Zylbersztajn and Farina, 2008). It is, therefore, in a form of a pipeline where the branches and roots are extensive network of customers and suppliers (Lambert and Cooper, 2010). In view of this, SCM is a network of dynamic relationship that is constructed, deconstructed and revised as circumstances dictate. The common denominator that separates the supply chain from the rest of the agribusiness system is the common goal held by the actors namely specific and superior value creation for a clearly defined market (Trienekens and Omta, 2012).

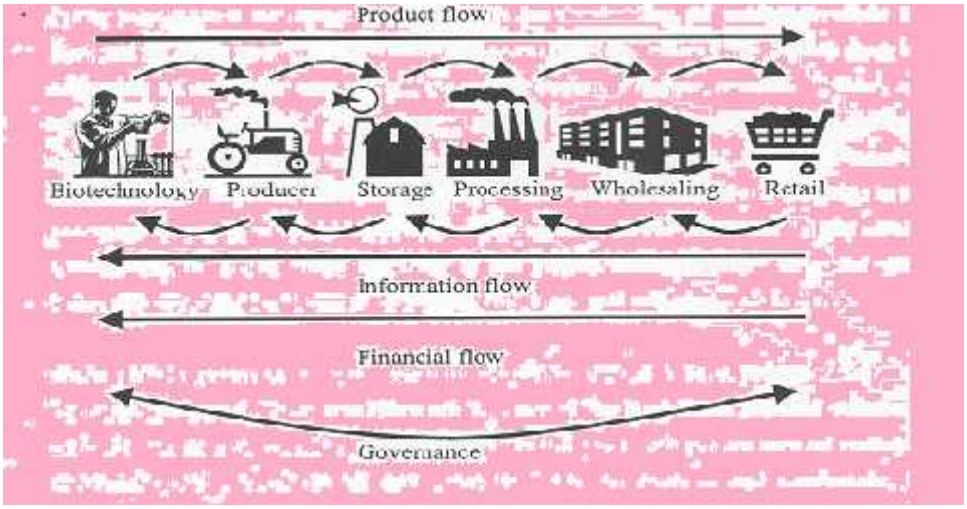

Figure 1.1: Supply Chain Coordination.

Source: Trienekens and Omta, (2012)

Secondly, Kotler (2010) observes that the SCM approach views markets as the only destination point. The company would be more effective by considering its target market first and then designing the supply chain backwards from that point. This criticism is justified as applied to the traditional view on SCM according to Stevens (2009), but it is clear from the recent authors that the definition and application of the SCM has expanded to a more integrative and holistic approach. Thus a demand chain would be a more applicable term to describe the process. The most important point is, when the word supply is used, it does not reflect that the chains are ready to respond to the customer demands but is there to ensure adequate supply only. A demand system management is upheld to avoid confusion as it is currently the most used term.

However, this study has proposed a working definition of SCM focusing on agribusiness that shall be applied throughout this work. This definition is a combination of facts as reflected in the definitions by Downey (2012) and Trienekens and Omta (2012). “Supply Chain Management in agribusiness is the collaboration and coordination of actors in the supply system from primary producer to the final customer, to better satisfy consumer wants and needs at possible lower cost”. This definition refers to the fact that SCM is the process of bringing order to the system of producing, processing, distributing and marketing of agri-products to consumers. Thus, SCM is just a system of integrating of all activities through proven supply chain relationships, to achieve an efficient delivery of products and services and sustainable competitive advantage. In other words SCM is the integrated planning, co-ordination and control of all logistical agribusiness processes and activities in the agricultural sector to deliver superior consumer value products. Generally, SCM includes the three basic dimensions of SCM namely behaviour, process and institutions. Thusprecisely SCM covers two main aspects, management of individual linksand management of all links from production to consumption in the chain perspective.

A summary of the meaning of CM is as follows:

- It is a co-operative process;
- Focuses on managing the distribution channels, processes and relationships;
- Refers to the system of production, processing and marketing of final products to consumers;
- It is a means of organisational structure and linkages;
- Improves the efficiency and effectiveness of the chain;
- Ensures competitive position in the market thereby ensuring Pareto improvement for the whole chain,
- Ensures delivery of healthy and safe food to consumers;and
- Creates customer satisfaction by rendering customer value products.

1.2.2 The Theory of SCM

SCM as proposed by Storey et al. (2012) is viewed as both an emergent field of practice and an emerging academic domain. Neither perspective is fully mature rather each has considerable promise. The future progress of each will be enhanced and, indeed, is ultimately dependent upon the other. The traditional setting of SCM is illustrated in Figure 1.2 whereby it indicates that in conventional agri-food supply chains, the interdependence between different chain actors is usually organised sequentially, one actor’s output being another actor’s input. According to Forsman and Paananen (2012), the value created by managing these transactions is delivered typically from reductions in transaction costs and logistics optimisation. However, the distance from the producer to the ultimate end-user is often long, both in space and time. They observe that

although the pursuit of transparency in the entire chain is accepted as a common goal in a conventional agri-food chain, including the product origin, this may be obscured when the product goes through several links before reaching the end-user as illustrated in Figure 1.2:

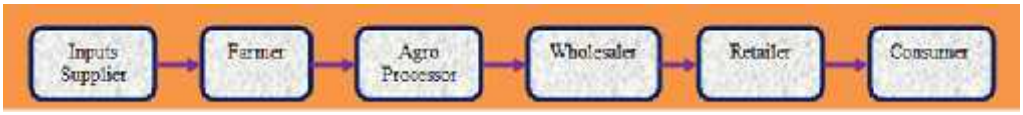

Figure 1.2: Traditional Way of Viewing the Agri-Food Supply Chain.

Source: Trienekens and Omta, (2012)

Forsman and Paananen (2012) bserve further that in the alternative way of looking at the agri-food chain, the chain is usually shorter in terms of the number of chain actors, and the distances, both in space and time, are considerably smaller than the conventional food chain. Although the transactions between actors in an alternative agri chain are also vertical thereby implying sequential interdependencies, what is more important is the reciprocal interdependence between the actors. This dependence according to Forsman and Paananen (2012), relates to knowledge co-specialisation, which means that one actor is strongly dependent on the knowledge of another actor. Hence, it is true to assume that to establish a functioning and sustainable short agri-food supply chains, the ties between chain actors should be strong and mutually dependent.

1.2.3 Supply Chain Management Conceptual Framework

This study was guided by the framework as illustrated in Figure 1.3.

Figure 1.3 Chain Management: Conceptual Framework.

Source: Author's Construction, 2010

1.2.4 Chains- the Object under Study

Although there is no consensus, wherever there is a phenomenon labelled as 'chain' basically is meant a network of connected organisations aimed at the fulfilment of consumer needs. In the case of an institution of needs, specific organisations form a specific chain as an instantiation within the wider network of latent

participating actors (Beers, Beulens and Van Dalen, 2007). The actors appearing as participants of the chain are connected by precedence relationships.

Chains are observed from different dimensions that are handled in an independent, almost orthogonal way. Recognising that a study of an object is very much 'paradigm driven', the paradigm in this case is a coherent framework of theoretical concepts, operationally related to empirical observable variables (Beers, Beulens and Van Dalen, 2007). The three different dimensions triggering the focus on chains are determined by several different aspects of the chain phenomenon. Observations are determined by the specific view on the object of study. Principles, ways of thinking and working are used to understand and interpret the observations. In relation to this, observations on the chain can be organised along the three dimensions namely Behaviour, Institutions and Processes. The dimensions are seen as representations of a group of scientific disciplines with observed chain phenomena as common element.

1.2.5 Chain Behaviour

The focus on chain behaviour deals with the chain as an entity in its own right. Behaviour is defined by the perception of the outside world on the performance of the chain. In that sense, outsiders ascribe behaviour. On the other hand,Beers et al (2007) state that there will be a common view within a chain with respect to its own behaviour and impressions of outside expectations. Although many types of outsiders (such as customers, government, local neighbours, banking, industry and suppliers) do have their perceptions of the chain behaviour, much attention is usually paid to consumer reactions.

Dominant scientific disciplines describing and explaining behaviour of chains are marketing, science and economics. Other disciplines that contribute to the behaviouristic view are psychology, law, environmental sciences, ecology, ethics, food safety and sociology. Research questions refer to such issues like determination and requirements of chain behaviour, measurement of behaviour such as performance, determination of relevant indicators related to the actual circumstances and management tools instrumental in dealing with perceptions. Practically, according to Beers et al (2007), chain benchmarking is an important tool for chain analysis.

1.2.6 SCM- a Multi-Disciplinary Approach

According to Trienekens and Omta (2012) SCM integrates and balances the different dimensions in an overall research and development approach to establish production, processing, trade and distribution of high quality

agri-products on national and international standards. According to Beers et al (2007), a product is created by a set of activities with precedence relations between them executed and directed by organisations within the production chain. The way these activities are organised, managed and controlled among several actors (such as agro-processing companies) is the focus of the institutional approach in chain studies. Thus in response to changes in agribusiness, business strategies must now focus not only on traditional economic and technological interests but also on topical issues such as safety and healthfulness of the agricultural products, gender and environment. The linkages between the actors are the primary focus of study as represented in Figure 1.4.

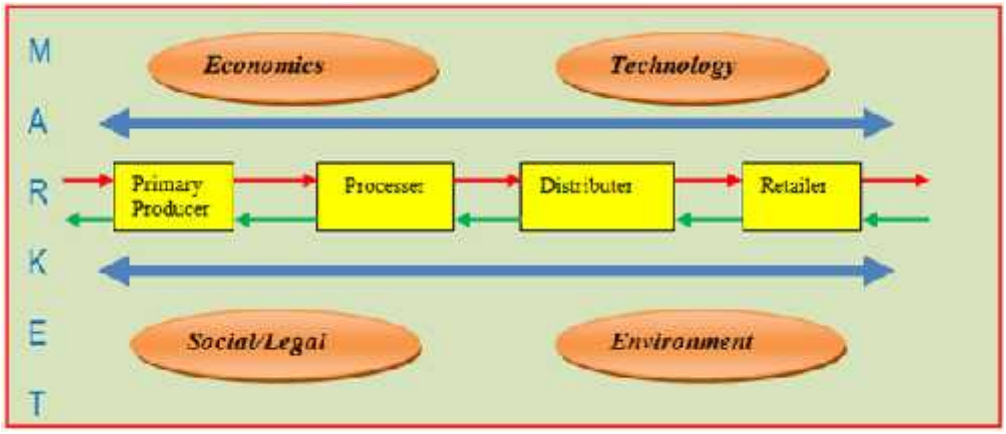

Figure 1.4: The Institutional view on chains

Source: Van Dalen, 2007

As Trienekens and Omta (2012) argue, the institutional perspective deals with the interaction between organisations in the chain. They cite the management ofcontracts, the pricing process, the exchange of information and the co-ordination and control of physical flows. Dominant scientific disciplines that work within the realm of this perspective are organisation and management theory and business economics. Other sciences involved are law, information science (ICT), transaction theory, management science and logistics whereas researchable scientific issues are directed towards the types, effectiveness, efficiency and conditioning of linkages. As illustrated in Figure.1.4, Trienekens and Omta (2012) believe that the system that covers the mechanism of demand and supply of agro-products should have a multi-disciplinary approach. The disciplines should represent different perspectives on the production, processing, trade and distribution of products since they are complimentary in agri and food system explanation.

1.2.7 The Processes Perspective of Chain

Trienekens and Omta (2012) view this perspective of chain as directed towards the activities needed to produce the required products. The focus on process is reflected in the manipulations of the product in different stadia of complexion, related to changes with respect to time (stockholdings), place (transportation) and qualities (material transformation). The aspects of process perspectives include variety, stability, volume and spatial distribution of products and production activities. In this respect, the dominant scientific disciplines are logistics and processing technologies. Therefore, from the scientific point of view, Trienekens and Omta (2012) remark that the objective of chain science is of an integrative nature. This concerns the development, validation and maintenance of a conceptual framework for integration of relevant chain concepts, as developed in various contributing scientific disciplines. Trienekens and Omta (2012) further believe that there are various critical questions about chain management in three dimensions. However, the most interesting is the question whether there does exist a kind of ordering between the dimensionsand whether there is a leading dimension among the three. Accordingly, Trienekens and Omta (2012) remind that operation of chains, chain development and the relation between theory and practical knowledge are some of the aspects influencing the interaction of the dimensions.

1.2.8 Dimensional Interaction

Chain operations, specifically related to physical flow of products (such as agri-products) can be described from the point of view of each of the three dimensions namely behaviour, processes and institutions (Trienekens and Zuurbier, 2012). Within the chain context, interaction can be visualised as presented in Figure 1.5. Shifting attention to development aspects of chains, a second level of co-ordination, can be detected as visualised in Figure 1.5. It can be envisaged that there are two levels of co-ordination between the three dimensions. These are chain development and chain operation. That is, the type of chain has to be developed first; the same should be put into operation.

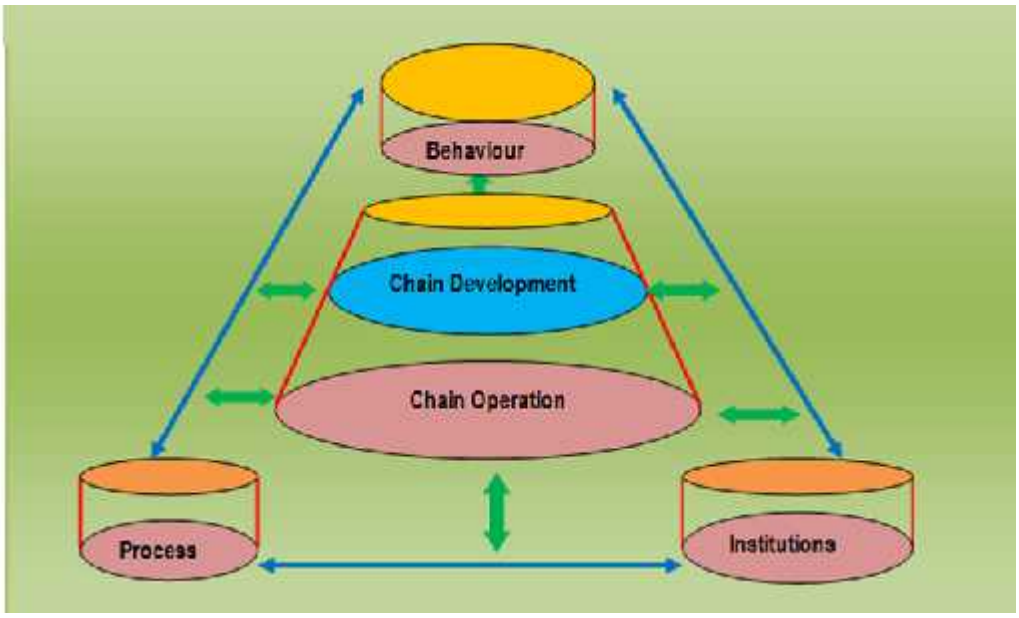

Figure 1.5: Interaction chain Practice and chain science

Source: Trienekens and Zuurbier, 2012

1.2.9 Interaction between Theory and Practice

Chain science development is guided by input form developments of different disciplines also from the merging process between different disciplines. Beers, Beulens and Van Dalen (2007) observe that the intriguing question is about how the interacting complex of disciplines match with practice The second question with respect to framework is about how well separate disciplines interact with each other to support the concerted development of the three dimensions in the framework. In this question, one may find similarity with the question on how (interacting) disciplines deal with the manifest interaction between behaviour, process and institutionalisation at operational level. Thus, one may find that the relationship between theory and practice is twofold. In combination with engineering sciences, knowledge is delivered that can be used for chain development. In this respect, the value of the model is assessed by classifying current research within our framework. Hence because of this transparency, the gap between science and practice is relatively bridged.

1.3 SCM Development in Agriculture-Historical Perspective

Historically, Staatz and Eicher (2009) observe that agricultural development in the 1950s placed more emphasis on the American model of agricultural extension and the diffusion model of agricultural development.

The model assumed that farmers can substantially increase agricultural productivity by allocating the existing resources more efficiently and by adopting agricultural practices and technologies from industrial countries. However, the failure of many agricultural extension programmes to achieve rapid increases in agricultural output and the inability of community development projects to solve food problems in many developing countries such as Tanzania, led to the reassessment of the diffusion model.

According to Staatz and Eicher (2009), one of the observations made during the assessment was that in many developing countries there were structural barriers to rural development such as highly concentrated political powers and assets ownership. In this view, it was discovered that farmers and herders had learned how to allocate efficiently the few and outdated factors of production available to them, including old technology. This implies that no appreciable increase in agricultural production could be realised by reallocating the factors at the disposal of farmers who are bound by traditional agriculture. Such a case is similar to Tanzanian environment where peasants in Tanzania use hand hoes in their daily farming activities. Staatz and Eicher (2009) suggest that increases in per capital agricultural output in developing countries happen only if farmers could be granted access to new and more productive factors of production (including new agricultural technologies) and the new skills on how to exploit them. They concluded that, given the existing technologies, farmers in developing countries such as Tanzania were efficient but poor. They also observed that since the majority of the farmers live the in rural areas, rural poverty lied in the lack of profitable technical package for farmers and investment in human capital needed to cope with changes in agricultural technologies. They proposed transforming traditional agriculture for a major shift from agricultural extension towards investment in agricultural research and human capital.

According to Staatz and Eicher (2009), in the 1960s Rockefeller and Ford Foundations and other organisations granted much emphasis on agricultural research by establishing International Rice Research Institute (IRRI) in the Philippines and the International Maize and Wheat Improvement Centre (CIMMYT) in Mexico. The authors note that such emphasis on research by IRRI and CIMMYT brought success in developing high-yielding varieties of rice and wheat that were rapidly adopted in Asia during the 1960s and 1970s in the Green Revolution or high-payoff input.

There are so many cases similar to Tanzania such as, for instance, the empirical evidence from the late 1960s and early 1970s whereby the economies of size in tropical agriculture were more limited than had previously been believed Najam (2010). Moreover, small farms often generated greater output and employment per hectare than it was in large-scale farming Najam (2010). Several scholars including Staatz and Eicher (2009)

argue that in many developing countries land reforms would stimulate economic growth because small-scale farms have higher potential for employment and land productivity than it is the case for large-scale farms. The higher land productivity is due largely to greater use of human labour (mainly family labour) per unit of land. There is widespread consensus among these scholars that land reform is an attractive policy instrument for raising farm output, increasing rural employment and improving the equality of income distribution among members of community. This is a typical case in Tanzanian environment where agriculture widely supports the income of the majority through small-scale farming.

1.3.1 Supply Chain Management in Agriculture

According to Trienekens and Zuurbier (2012), the aims of SCM in agribusiness are to feed people with food items that satisfy their demands, to increase co-ordination of the supply chain due to intensity of competition and turbulence at the market and to satisfy the market demand for continuous flow of improved, safe and healthy products to the markets. This is because consumers' interest in these attributes makes it necessary to manage the supply chain to guarantee quality, safety, healthfulness and other related attributes. These developments pose new challenge to the agricultural sector to embark on CM as one of the solutions. Thus, squeezing the time to bring these products to the markets justifies the need for efficient mechanisms for mobilising the competencies in the supply chain. Ultimately, these developments compel the agricultural sector to embark on the application of SCM principles.

A CM or simply supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Supply chains exist in both service and manufacturing organisations, although the complexity of the chain may vary greatly from industry to industry and firm to firm. Below is an example of a very simple supply chain for a single product, where raw material is procured from vendors, transformed into finished goods in a single step, then transported to distribution centres and ultimately, to consumers. Realistic supply chains have multiple end products with shared components, facilities and capacities.

Traditionally, marketing, distribution, planning, manufacturing and purchasing organizations along the agricultural supply chain are operated independently but are coordinated in order to serve the same customers. These organizations have their own objectives that are often conflicting. For instance, the objective of quality customer service and maximum sales may conflict with manufacturing and distribution goals. Many

manufacturing operations are designed to maximize throughput and lower costs with little consideration for the impact on inventory levels and distribution capabilities. Purchasing contracts are often negotiated with very little information beyond historical buying patterns. The result of these factors is that there is not a single, integrated plan for the organization as there are as many plans as businesses. Noticeably, there is a need for a mechanism through which these different functions can be integrated together, CM being a strategy through which such integration can be achieved.

A CM typically lies between fully vertically integrated firms, where the entire material flow is owned by a single firm and those where each channel member operates independently. Therefore, coordination between the various players in the chain is key in its effective management. Cooper and Ellram (2013) compare SCM to a well-balanced and well-practiced relay team. Such a team is more competitive when each player knows how to be positioned for the hand-off. The relationships are the strongest between players but the entire team needs to make a coordinated effort to enjoy the benefit of the supply chain.

1.3.2 Agricultural Production Support Activities and Services

Growth in agricultural production is necessary not only to increase food availability and raise the income and nutrition levels of the population, but also to the development process. According to Colman and Young (2004), it is widelyaccepted that a prerequisite for rapid economic growth is the channelling of agricultural surplus (production in excess of own consumption) to the non-farm sector. They observe that in terms of production processes, the successful CM in agriculture should focus on: -

i. The activities and services that influence the supply of agricultural output;
ii. The factors which govern usage of productive inputs (like labour, fertilizer, and machinery);
iii. The efficiency of resource use; and
iv. The impact of technological change.

Colman and Young (2004) pointed out that in production theory, the main choices centre upon what to produce (which product or combination of products), how much to produce (the level of output) and how to produce (the combination of inputs to use or and technology). They remark that this is focal point to the analysis of agricultural markets and, in particular, to the design of effective development policies aimed at motivating agricultural producers, mobilising resources in the sector and spreading new technologies. Meanwhile, Taylor & Fearne (2006) suggest that there is a considerable body of literature describing the demand implication in different scenarios and industry sectors. They further observe that those studies have used a system dynamics

approach to develop computer-based simulations of agricultural supply chain activity thereby testing various theoretical strategies to reduce demand implication.

According to (Taylor, 2010) and Taylor and Fearne (2012), the detrimental effects of demand implication are well understood and include excess inventory, poor agricultural production, difficulties in resource planning and increased production and delivery costs. However, recently the phenomena have been well understood and solutions are available. Further, Taylor and Fearne (2012) explain that studies on demand of agricultural production tend to highlight the need for improved information management and timely transmission of demand data as a basis for developing closer collaboration across the supply chain. Considerable emphasis is placed on co-ordination and communication at the farm producer-customer interface and joint decision-making with respect to the demand forecasts, production scheduling, distribution and contingency planning. However, there is a widespread recognition of the supply chain implications of production demand management whereby very few authors discuss the practical difficulties of implementing the concept beyond the downstream buyer/seller dyad.

In accordance with the definition of SCM adopted by this study, the above statement proves its importance in the agricultural production. Production is among the aspects that need synergism in terms of developing improved seeds, usage of proper chemicals and manure, application of modern production technology such as agro-mechanisation and other extension services. Generally, the collaboration of these sub-elements brings sufficient production in the agricultural sector. According to FAO (2011), agricultural production takes direct as well as indirect forms of support. Government intervention in agriculture is not confined to agricultural policy alone. Its clarifications indicate that the general policy focus of the government on support to agricultural production should be on commercial, fiscal, monetary, and social or employment aspects. Not only that but also government policy on agriculture should put thrust on budget expenditure to areas affecting transport, telecommunication, industries or energy such that they provide full support to agricultural sector production.

All governments aid their agricultural sectors through the development and dissemination of new technologies. While expenditures may not stand out as particularly significant, this aspect of agricultural policy is very important in the longer term because of its contribution to productivity. As research results are disseminated through the education and extension services, they generate improved productivity and add to the supply pressures, already severe in many cases (OECD, 2007). As it can be observed, agricultural policies have rarely considered the fact that such changes in technology and productivity add to the downward pressure on

agricultural prices. In so doing, they play a very important role in the overall supply-demand balance thereby influencing the trade situation in the longer term.

1.3.3 Agro-processing Support Activities and Services

The nation's agricultural processing industries are often taken for granted as a feature of the economic landscape so unremarkable and even invisible. Food processing industries are invisible because they use old methods of productionand food factories are mainly of small scale. Moreover, processed food products seem unfamiliar as are believed to be luxurious and for high class families. It is important to note that industrial food processing is not traditionally closely linked to domestic household activities. Thus many processing industries were not originally part of the farm operations (such as butter or cheese making) or kitchen activities such as pickling and baking. However, while there is an element of truth in these views, some processes employed by food processors (such as flour milling) are indeed of prehistoric origin, but the methods and technologies used today are the result of modern scientific discoveries (Connor and Schiek, 2007).

Recently, the demand for agricultural processing is derived from the needs and wants of the consumers. As consumers have become more numerous and diverse, market channels have evolved to cater for them. It is crucial also to examine the strategies employed by food processors to target specific groups of consumers, and the means by which processors inform and persuade consumers through product promotion. Connor and Schiek (2007) argue that designing strategies to meet consumer demands does not occur in the vacuum. Product development and manufacture is necessarily dependent on the availability of inputs and the means by which both the cost and quality food processing inputs can be managed. This is important in order to reduce the preparation time for consumers, increase palatability, storability and convenience. In other words, agro-processing is crucial through the use of factory systems to add economic value by transforming products grown on farms.

Connor and Schiek (2007) argue that adding value to farm products and other material ingredients is the way in which the agro-processing industries contribute to the firm's and country's economy. The sum of the value added of each company is the value added of an industry; the sum of the value added of all industries approximates the national economy's GDP. They argue further that the principal and economic function of agri-processing is to convert various agricultural products into finished consumer-ready products. Agricultural products processors perform a number of value-added economic functions that are shared with other agri-marketing companies such as farm product assemblers, grocery wholesalers, transporters, retailers and

agricultural product service providers. They give an example of food processors that add value by transforming products through space and time. That is, most processors are willing to deliver or arrange for delivery of finished products to grocery wholesalers. Generally, the essence of this explanation is to indicate the importance of agri-processing so that the SCM can focus on it as well.

Perhaps the most interesting aspect of physical storage and movement of products is the information function of agricultural processing firms. Because of their central position, agri-processors have abundant and, at times, unique access to sources of information on the quantities, quality and prices of processed agri-products. Agri-processors, especially companies specialised in making semi-processed products, spend significant corporate resources collecting, studying and forecasting information on agricultural supplies in the firm's region or even world-wide (Connor and Schiek, 2007). The information collected about consumer demand and agricultural supply condition comes together at the processing nexus. In addition to price-quantity information, processors are repositories of knowledge about food and agricultural product quality. They understand issues such as fine gradations, the flavour of coffee beans, the moisture content of a shipment of corn, the shelf life of products under various handling conditions, and nutrition characteristics, to name a few.

Connor and Schiek (2007) conclude that agri-processors are in the sole position to formulate and design foods, considering consumer preferences, distributor's demands, and ingredients availability, scientific knowledge of biological properties, technical feasibility and profitability as their critical task. Agri-processors share some of their food quality information through ingredient labelling and other programs that assist consumer services in CM. In this view, through quality control and product testing, agri-processors assume much of the responsibility to protect the safety of the national agricultural product supply.

1.3.4 Agricultural Marketing Support Activities and Services

According to Kotler (2010), marketing is the management function responsible for identifying, anticipating and satisfying customer requirements profitably. Therefore, marketing is both a concept and a set of techniques, which address such matters as research, product design and development, pricing, packaging, sales and sales promotion, advertising, public relations, distribution and after-sales services. Bradley (2005) define marketing as a social and managerial process by which individuals and groups obtain what they need and want through creating, offering and exchanging valuable products with others.

In accordance with the current academic practice, marketing is considered as the business activities associated with the flow of goods and services from production to consumption. The marketing of agricultural products begins at the farm level, with planning of production to meet specific needs and wants as well as markets prospects. Marketing is completed during the sale of the fresh as well as processed products to consumers or manufacturers for the case of raw materials for industrial processes (Abbott, 2007). He explains further that agricultural marketing also includes the supply of fertilizers and other relevant inputs for production to farmers. According to Abbott (2007), marketing tasks and responsibilitiesmay be summarised as follows: -

i. Finding a buyer and transferring ownership;
ii. Assembling and storing;
iii. Sorting, packaging and processing;
iv. Financing of marketing and risk taking; and
v. Assorting and presenting to consumers.

If marketing is to fulfil its role of stimulating and extending development, specific firms must be responsible for finding domestic as well as foreign markets for the various types and qualities of produce. “In export marketing, or in substitution for imports in domestic markets, the firms must be able to match the competence of rival enterprises in other countries” (Abbott, 2007). Hill and Ray (2007) consider the marketing of agricultural and food products as one of the two ways; either as a commercial activity carried out by farmers and food companies along the food chain or as an area of concern for policy makers in government. It can be noted that successful marketing in agriculture requires organisational integration and where individual farms and food firms are unable to provide sufficient integration, we may expect to see integration imposed by the commercial expansion or the government. This is because the concept of marketing involves all those concerned with research, development, design, production, finance, distribution, after-sale services as well as the labour force.

There are special features that make agricultural marketing different from other forms of marketing. There are a large number of small farm businesses each supplying more or less the same product. Many of these farms are limited to a few production possibilities and individual farmers are seldom in a position to apply the marketing concept. Instead they rely on joint action through co-operation or crop marketing boards. This is the case in countries such as Spain and Italy where farms are much smaller and marketing disadvantage is so large. It is for this reason that the EC introduced policies to improve marketing through co-operatives. Farms in the same countries are so small but co-operatives are very strong and well organised. For instance, there is no such problem in Denmark and the Netherlands anymore (Hill and Ray, 2007).

1.3.5 Government's Role in Marketing of Agri-products

A far-sighted government will orient its overall policy framework towards growth of those enterprises that are able to take on the necessary marketing responsibilities and will establish and maintain a favourable economic and political climate for this to happen. Abbott (2007) proposes that governments should provide and maintain basic requirements of marketing such as railways, airports, roads, bridges and other facilities for transport, and and telecommunication services. . Furthermore, the provision of organised markets such as local assembly, wholesale and retail at convenient places must be central or a local government's responsibility. Abbott (2007) further recommendes the collection and dissemination of marketing information on crop prospects, prices and supplies in producer wholesale and retail markets because it can be undertaken more efficiently on behalf of all market participants than by any individual. "In addition to these, the importance of banking services cannot be overemphasised, thus the development of banking system oriented to financing marketing operations needs government apparatus to work on it" (Abbott, 2007).

As regards marketing challenges facing the agricultural sector, Verhaegen and Van Huylenbroeck (2011) suggest the establishment of Farmers' Markets in order to increase the income of farmers or unify the domestic quality characteristics of the products. The central idea is that of domestic quality of farm products produced at local farms. Thus, it is the local reputation that attracts consumers and increases the sales volume and, in turn, the farmers' revenues. Although some people consider it weak, the governance structure of Farmers' Markets is sufficient to create a framework to allow the Farmers' Markets transactions to take place and to realise the economies in transaction costs (Verhaegen and Van Huylenbroeck, 2011).

Castano (2011) observes that developing countries suffer from marketing imperfections due to excess use of distorted resources because market signals, such as demand and market risks, that are transmitted via the market channels and received by farmers do not fully reflect the market panorama. He argues that market imperfections tend to mislead farmers towards inappropriate farm decisions with respect to resource allocation and use. Therefore, Castano (2011) suggests that identifying a strategy that addresses and corrects market imperfections and guides adequately farm-resource decisions is definitely fundamental for the long-term continuance of small-farm system in developing countries.

Verhaegen and Van Huylenbroeck (2011) observe that the agricultural sector has experienced several evolutions that have prompted farmers to start or to participate in new production and or marketing channels. The authors mention such evolutions as the fact that farm income continues to be lower than comparable income in spite of the continued concentration of agricultural production on fewer farms and with less farmers

and farm workers. Another is that the possibilities of increasing farm income are limited because agricultural markets are saturated due to regulations on markets and environmental issues that restrict agricultural activities. Finally, there is the loss of independence due to the growing number of regulations, integration of the sector and direct income support by the government. Verhaegen and Van Huylenbroeck (2011) view that the EU agricultural policies have shifted away from supporting agricultural income via market and price policies and toward a policy based on direct income support. As aresult, agricultural policy is gradually shifting towards rural policy, which in turn, gives the necessary support (such as advice, education and investment support) to competitive enterprises in areas that are naturally suited for an agricultural enterprise competing in the global market place. In other areas, Verhaegen and Van Huylenbroeck (2011) appreciate that multifunctional agriculture has promoted extensive agriculture, organic agriculture and agriculture which offers recreation or regional products to the consumer. They conclude that both producers and consumers are looking for alternative forms of agricultural production, food consumption, new supply channels and new rural products.

1.3.6 Prices of Agri-products

The price of agricultural products (including coffee) influences the performance of the agricultural sector and the well-being of the producers and consumers. Price Policies determine or strongly influence food and agricultural prices, but production increase depends criticallyon the adequacy of the whole agricultural infrastructure. By themselves, price incentives are necessary but not sufficient (FAO, 2012). In addition, prices are of daily concern, especially for developing countries that are increasingly dependent on purchased rather than home-grown supplies. Most people depend on better prices for their agricultural products in order to afford imported supplies. Thus, according to FAO (2012), governments are giving more attention to improving agricultural price policies than at any time since the early post WW II period.

FAO (2012) suggests that price changes in the food and agricultural sector at large directly affect incomes demand output and indirectly affect the demand for and supply of non-agricultural commodities and their prices (they have multiplier effect). They even affect government's revenue and expenditure as well as exports and imports of both agricultural and non-agricultural commodities. However, a rise in food prices may lead to an increase in industrial wages and general inflation. Thus, it threatens industrial profits and output at large. This suggests that agriculture and the economy as a whole form a web of complex interdependence. The effects of change in prices of agricultural commodities are summarised in Table 1.1.

Table 1.1: Effects of Change in Prices of Agricultural Commodities

Nature of the Change Introduced	Main Consequences Observed
Increase in producer (farm gate) price in food crops	© Output of food crops increases and that of export crops fall © Higher incomes of food producers expand the aggregate demand © Inflationary impact is reflected in higher consumer prices © Budget outlay on food procurement rises © Government's savings share of total revenue falls
Increase in producer (farm gate) price of export crops	© Output of agricultural export crops commodities increases © Food crops production decreases © Macro-economic effects to but less potent than above
Increase in consumer food subsidies	© Consumption of both food and non-food items rise as purchasing power increases © Food imports increases © Adverse BoP effects at least in short-run © Fiscal costs of subsidies rises
Increase in agricultural inputs subsidies (reduction of import duty on imported agricultural inputs)	© Agricultural output increases © Consumption and incomes for all sectors rises, agricultural income increases more than wages and profits © Fiscal costs become higher (tariff/taxes or revenue falls)

Source: FAO (2007)

Agricultural prices affect development in other sectors of the economy, but the reverse also holds (Cramer and Jensen, 2011). They argue that policy action directed to some aspects of the economy can have serious repercussions on agriculture. The priority given to industrialization over agriculture in the development strategies of most developing countries including Tanzania is a vivid example. For example, different policies on price, investments, trade and exchange rate and manufacturing have been much more protected than agriculture. The logical result of these policies is that agricultural growth has taken place at a slower rate than would otherwise have been achieved. FAO (2007) summarises policy implications regarding instability of agricultural prices that the far-reaching effects of policy bearing on prices are evident in the interdependencies illustrated in the whole economy or inter-sectoral analyses above. The policy issue, which is clear in the view of this, is that agriculture alone, and equally, neglect in macro-economic policy of the need for appropriate prices in agriculture can be expected to cost dearly.

1.4 SCM Practices

In the following sections empirical literature including the literature on SCM in both developed and developing countries specifically, focusing on coffee in Tanzania will be presented. It will also explore extensively coffee production, processing and marketing in Kagera Region.

1.4.1 Agriculture in Tanzania

In recognition of the importance of agriculture, URT (2009) and MoFEA (2009) highlight that the economy of Tanzania for a long time now has remained untransformed. The agricultural sector, which is popularly known as the backbone of the country's economy, continues to be more dependent chiefly on natural weather condition (particularly rainfall) and on old technology rendering the sectoral productivity low and erratic. The Ministry of Agriculture (2012) confirms that the agricultural sector development has been characterised by low level of mobilisation of domestic natural human and financial resources to produce wealth and raise the standards of living of people.

In 2001 Tanzania approved the Agricultural Sector Development Strategy (ASDS), which was guided by the Poverty Reduction Strategy (PRS), the Rural Development Strategy (RDS) and the Tanzania Development Vision 2025 (TDV). ASDS focuses on agricultural productivity and profitability by creating a favourable environment for investing in agriculture (Ministry of Agriculture and Food Security, 2012). It also aims at encouraging farmers to produce according to demand, promoting participation of the private sector in agri-business, fostering processors and grower partnerships, and ensuring implementation of ASDS through District Agricultural Development Plans. Likewise, in 2001 Tanzania adopted the Agricultural Sector Development Programme (ASDP) as a tool for implementing and achieving the objectives of the ASDS. This is a five-year programme but its implementation will be rolled into a three-year Medium Term Expenditure Framework (MTEF). The Government emphasises priority areas in the ASDP that need special attention as cross-cutting and cross-sectoral issues. These include, seed multiplication, crop protection, soil and water management, irrigation, market development, agricultural finance, agro-mechanisation, agro-processing and producer organisation. From the foregoing literature, these issues are interrelated activities that call for application of SCM.

The Government of Tanzania places a high priority on reducing poverty and food insecurity. Achieving these objectives is closely linked to the improvement of performance of the agricultural sector because most of the rural poor (which are about 90 % of the total population) earn their income from agriculture. Because most of the Tanzanian farmers supply the overwhelming majority of food consumed in the country, the World Bank (2011) and FAO (2007) observes that agriculture has the multiplier effect when there is a rise in prices of farm products and of rural income on no-farm incomes.

URT (2009) notes that the overall performance of the agricultural sector in Tanzania during the post-reform period (1996 and beyond) has been respectable but not outstanding. In 2009, the agricultural economic

activities grew by 4.8 percent compared to 4.0 percent in 2009. However, it indicates that the growth rates in crops and livestock were 5.4 and 2.6 percent in 2009 compared to 4.0 and 4.5 percent in 2008 respectively. Similarly, the contribution of agricultural activities to the country's GDP was 25.7 % in 2009 compared to 25.8 % in 2008. Therefore, URT (2009) asserts that the contributions of the crops sub sector to the GDP slightly increased by 19.1 from 19.0 in 2008. As this study is more focusing on a cash crop, the production of this category of crops which include coffee, cotton, sisal, tea cashew nuts and tobacco increased in 2009 compared to 2008. Coffee production increased by 36.0 % from 33,708,000 tons in 2008 to 58,052,000 tons in 2009. However, MoFEA (2009) observes that the low level of production and growth rates was due to the impact of global financial and economic crisis compared to the predetermined targets.

Financing of the agricultural sector indicates the sharp drop of the development budget as a share of total in the 1990,s. The local development budget drastically declined from an average of 17 % of the sector expenditures in 1990/92 up to only 2 percent in 1996/98. External financing for the agricultural sector is incorporated in the development budget, which decreased significantly since 1994/95. The share of external support to budget of MAC declines from 60 to between 10 and 20 %. This implies an even larger drop in absolute funding since the total budget for MAC is declining in absolute terms.

Table 1.2: Budget Allocations to Agricultural Sector from 2001/02 to 2007/08

Budget Item	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Administration (%)	10	5	4	9	13	29	32
Crop Development (%)	44	47	55	49	48	34	36
Research & Development (%)	22	30	18	10	15	15	12
Co-operative Development (%)	6	3	4	5	9	4	4
Food Security/grain reserve (%)	7	5	6	12	11	3	3
Livestock Development (%)	12	9	13	16	4	15	13
TOTAL (%)	100	100	100	100	100	100	100
Total Vote (Mil. Tsh)	62,696	63,252	40,161	26,420	21,829	37,047	44,421

Source: Ministry of Agriculture and Food Security Tanzania, (2009)

Note: Total Vote (Total Budget) includes recurrent and development expenditures

Table 1.3: Sources of Funds for Agriculture (in percentage) from 2001/02 to 2007/08

Source of Funding	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Recurrent	45	37	64	89	74	41	35
Development (local)	4	4	7	1	3	3	5
Development (Foreign)	51	60	29	10	23	56	59
Total MAFS/Gov't	3.6	4.3	3.6	2.7	2.1	4.1	3.8
Other rural Sectors/Gov't	5.2	3.7	1.3	1.5	2.4	2.9	2.1

Source: Ministry of Finance Tanzania, (2009)

Table 1.4 reports budget expenditures of different countries and regions of the world showing how much in terms of finance the various agricultural activities are supported. The figures cover a reference period (2001/02-2007/08) in which almost all expenditures in most countries studied generally increased both in nominal and real terms. This gives an indication of the changes by major categories of agricultural policy implementation in each of the countries analysed. It is learnt from FAO (2012) that if the importance of each of the measures in a particular agricultural policy is defined by the ratio of its costs to that measure as a whole, all countries analysed, except the United States and Australia, gave precedence to price and income support measures. It clearly indicates that the proportion of support varied amongst countries. For instance, Austria was 69.3 %, 56.8 % in EEC, Canada devoted 51.8, Japan was 43.8 % and 33.3 % in New Zealand. As for the United States, it devoted 54.6 % of her total budget expenditure for processing, marketing and consumption aid while the latter was financed to 52.9 %, accounting for the lion's share of that amount. In Australia, the emphasis was on research, training and advisory work that was granted with 46.4 % of the total budget to agriculture.

Furthermore, the table indicates that much support is given to research, training and advisory work in all EEC countries. According to FAO (2012), usually the central government finances most of the research and training. However, in some countries, the cost of advisory work has been gradually transferred to farmers themselves. These activities specifically aim to raise productivity and the potential yields of both plants and animals and have certainly contributed a greatly to increased production in agriculture. Table 1.4 indicates financing of agricultural sector in OECD countries as summarised in the discussion above.

Table 1.4: Public Expenditure Related to the Implementation of Agricultural Policy 1999-01

Country	Agric I		Agric II		Agric III		Agric IV		Agric V	
	Mil ECU	%	MilECU	%	Mil ECU	%	Mil ECU	%	Mil ECU	%
USA	814.0	4.2	542.2	8.2	1607.8	8.3	1,0581.1	54.6	3,548.7	22.3
Canada	173.5	10.6	66.6	4.1	151	9.3	243.6	14.9	847.7	16.6
Australia	217.0	46.4	84.5	18.1	28.0	6.0	32.8	7.0	101.4	11.9
New Zealand	49.7	19.9	44.7	18.0	71.5	28.7	0.2	0.1	83.1	26.2
Japan	340.3	3.3	36.3	0.4	3,861.3	37.9	163.2	1.6	4465.8	24.1
Austria	13.9	2.9	_	_	125.6	25.9	9.0	1.9	335.9	3.4
EEC (National)	1,263.8	13.0	454.8	4.7	4,733.6	48.7	1,506.4	15.5	1,630.7	30.0
EEC Total	1,268.5	6.0	454.8	2.2	5,125.2	24.2	2,163.9	10.2	12,008.9	8.7

Source: OECD Report (2012)

KEY:- Agric. I Research, Training and Advisory Services
Agric. II Inspection and disease control Services
Agric III Rationalisation of Production, Improvement of Structures and Rural Development
Agric IV Processing, Marketing and Consumer Aid
Agric V Price and Income Support

1.5 Coffee

Coffee is one of the most traded commodities in the world. Ghoshray (2010) and Ponte (2012) point out that during the post-World War II, it has been the second most highly traded commodity after oil. Coffee is not a homogeneous good and the market may be divided according to the different qualities of coffee. There are two species of internationally traded coffee, 'Arabica' and 'Robusta'. Arabica produces superior-quality beans, whereas Robusta produces beans that are of relatively lower quality than Arabica. According to Petit (2007) and Ponte (2012), Coffee is produced in more than 50 developing countries providing income for approximately 25 million smallholder producers and employing an estimated 100 million people. In 2005/2006, 52 per cent of world production was accounted by the three main coffee producers (Brazil, Colombia and Vietnam), Brazil currently supplying about a third of total production. The top five consumers are USA, Brazil, Germany, Japan and France, while the Nordic countries have the world's highest coffee consumption per capita. About 65% of the world supply of coffee is Arabica, while Robusta makes up around 35%.

Petit (2007) notes that with the rise of neo-liberalism from the early 1980s, international trade in coffee has been radically transformed from a managed market, in which governments played an active role, to a free market. He explains that formally the international trade in coffee was regulated through an export quota system which existed under various International Coffee Agreements (ICAs) between 1962 and 2000 implemented by the International Coffee Organization (ICO). Producer country coffee agencies subsequently lost all the influence on the international trade market and prices dropped dramatically. The market liberalization and its price effects had a major impact on many smallholder producers. However, both Petit (2007) and Ponte (2012) agree that the second thing is domestic market liberalization. Many producer countries including Tanzania, undertook market reforms during the 1990s as part of the structural adjustment programmes promoted (or imposed) by the International Monetary Fund and the World Bank.

The outcome of these reforms continues to be debated, but some common trends noted in the literature by Petit (2007) and Ghoshray (2010) include a higher proportion of the export price paid to farmers; increasing price volatility following the abolition of price stabilization mechanisms; much more constrained access to credit for farmers and traders; more involvement of the private sector and a loss of market share for

cooperatives and former parastatals. Finally, coffee market reforms have also often led to deteriorating coffee quality (Ponte 2012). Nonetheless, Ponte suggests that 'market liberalization may be the best option for some countries and that highly regulated markets may be the best for others, even within the framework of the same commodity'. The third aspect, in addition to the changing policy environment, coffee has witnessed structural changes in global supply and demand. One major area of change is the dramatic expansion of Robusta production in Vietnam during the 1990s and Arabica production in Brazil where innovative low-cost production systems have been developed. The increase in both the quantity and quality of coffee in Brazil and Vietnam has resulted in strengthening of their domination of different market segments which, in turn, is increasingly marginalizing other producers.

The loss of market power of coffee producing countries and the loss of market share by some of them in the reconfigured global coffee value chain is closely related to changes in the policy environment (market 'reform'). The abolition of marketing boards has further reduced the capacity of farmers to raise their share of value-chain rents (Fitter and Kaplinsky 2011). According to Scholer (2014), five international coffee trading houses have captured an increasing share of the coffee trade, covering about 40 % of the total volume of green coffee imports worldwide. Similarly, ten roasters account for 60–65 % of all sales of processed coffee, most of which is sold under brand names.

1.5.1 Coffee in Tanzania

Coffee is one of the two largest agricultural export crops in Tanzania with the foreign exchange earnings of about USD 115 million per year (World Bank, 2011 and Kessy, 2010). There are two varieties of coffee grown in Tanzania, namely Arabica and Robusta, while the main producing regions are Kagera and Kilimanjaro,which account for about 70% of the total country production. Other regions include Ruvuma, Mbeya and Arusha. In the late 1980s, successive devaluation of the Tanzanian shilling increased the average producer price for Arabica (one of the varieties of coffee grown in Tanzania) but the sharpest increase was in 1994 following the liberalization of export and the entry of private buyers. Kessy (2010) highlights that this increase in producer prices resulted in an increase in harvests presumably due to greater input use and harvesting effort. Yields are normally low because of limited use of fertilizer, butpart of the declining trend in coffee production is due to a reduction in planted area, a phenomenon that began to reverse after the boom in 1997. One of the main problems facing the coffee production is the absence of a system for providing inputs on credit (Kessy, 2010). It is risky for a buyer to extend credit to farmers without being sure that he will be able to buy the harvest and thus recover the loan. A system of input vouchers is currently being tried by which farmers are paid for their

harvest partly in cash and partly in vouchers that are redeemable for fertilizer and other inputs. The trend of production of coffee from the buying season 2000/01 to 2012/13 is as indicated in Table 1.5:

Table 1.5: Coffee Production in Tanzania from 2000/01 to 2013/14 (Metric Tons)

SEASON	ARABICA			ROBUSTA	TOTAL
	MILD	HARD	TOTAL ARABICA		
2000/01	35142	2096	37238	9710	46948
2001/02	32933	1279	43212	9279	43491
2002/03	19789	1894	21683	9165	30848
2003/04	23605	2590	26195	13523	39718
2004/05	18171	3593	21764	1078	32842
2005/06	37176	3805	40981	17007	57988
2006/07	38000	3500	41500	12000	53500
2007/08	37294	4766	42060	34468	76428
2008/09	20716	1850	22566	16138	38704
2009/10	23870	888	24758	9133	33891
2010/11	25506	2372	27878	21028	44906
2011/12	33345	2417	35762	19076	54838
2012/13	26330	1588	27918	15606	43524

Source: URT, 2013

1.5.2 Coffee in Kagera-Literature Gap

Both theory and practice of SCM literature reviewd above is all about the definition of SCM that gives a general understanding about this body of knowledge. It clearly indicates that SCM is very rich in such a way that it can accommodate and be applied in a lot of disciplines. The theoretical part indicates the success and challenges encountered by the application of SCM in various disciplines while the empirical side has tried to document the areas where this model has beenapplied in various countries of the world outside Africa. Theme exist extant the application of SCM in agriculture is in both theory and practice across the world (e.g FAO, 2006; Ghoshray, 2010; Petit, 2007; Verhaegen and Van Huylenbroeck, 2011; and Trienekens and Omta, 2012). Little literature on the application of SCM in agriculture exists in Tanzania especially in terms of marketing aspect.

Arguably, little has been explored regarding the application of SCM in agriculture in Tanzania. Although SCM has been negligibly touched in the area of agriculture, a gap of information is clearly seen on coffee SCM and, more precisely, in Kagera Region. The literature reviewed show that little has been exploited regarding the application of coffee SCM principles in order to link coffee production, processing and marketing services in this region. Some scholars such as Kessy (2012), Komba (2014) and Mwakaje (2008) have attempted to explain what is happening in some segments of the coffee supply chain but not entirely. Since it is difficult to analyse the entire supply chain, this study examines production, processing and marketing support activities and services along the entire coffee supply chain in order to fill the existing gap.

1.6 Statement of the Problem and Justification

Tanzania is endowed with arable land for agriculture and is significantly rich with natural resource base including minerals, vast land, forests and woodlands, wild animals, rivers with a significant hydropower potential, lakes and wetlands, and agricultural land (URT, 2010 and URT, 2011a). In addition, due to good climate and soils, Tanzania produces major traditional cash crops including coffee, cotton, cashew nuts, sisal, tea, tobacco, closes, horticultural crops, oil seeds, spices, flowers and pyrethrum (URT, 2012f, and World Bank 2011b). The analysis of the natural resource shows that Tanzania has large untapped agricultural resources (URT, 2011a). Nevertheless, the sector has been growing at a slower rate whereby the decrease in agricultural performance was attributed to the drop in production in the crop sub-sector (URT, 2012c). Together with low agricultural performance, Tanzania has been depending on agriculture as the mainstay of its economic and social development (Isa, 2014; Nchahanga 2012 and FAO, 2011). In 2010 the agricultural sector was the largest contributor to total GDP by more than 50.0 % and is still employing more than 80 % of the population, but contributing only about 25 % of the GDP. Furthermore, from 2000/01 to 2013/14, coffee production drastically decreased from 57,988.0 tons to 43,524.0 tons respectively, thus indicating a change of -20.6 % between the year 2006/07 and 2011/12 whereby production sharply dropped from 54,838.0tons to 43,524.0 tons.

From the foregoing analysis, poverty in Tanzania is most persistent among the rural population and it is a rural phenomenon as about 80 % of all the poor live in rural areas and rely on agriculture (Limbu, 2005; FAO, 2001b). World Bank (2011b) shows that poverty in Tanzania remains widespread and deep such that after four decades of independence, it is still one of the 10 poorest countries in the world. IFAD (2012) estimated that about 50 % of the population of Tanzania lives below the poverty line. That is, their per capita incomes are less than one American dollar per day. A number of studies have given a number of reasons that led to the prevailing conditions for agricultural stagnation. IFAD (2012c) and Msolla (2014) argue that the agricultural stagnation persists because farmers use poor and outdated technologies such as hand hoe for cultivation. They also use little or no fertilizers and lack improved seeds. URT (2011a) and Keenja (2002) also believed that productivity of most crops could be increased five times by the use of appropriate farming methods and the use of agricultural inputs. IFAD (2013) maintains that small-scale subsistence associated with low production and productivity is the reason for agricultural stagnation. Researchers such as Msolla, (2014) and Limbu (2005) argue that the only mitigation available is to transform such small scale farming to medium and large-scale farming.

It is evident that each of the above analysis came up with its different recommendations. In spite of the above recommendations, challenges in agriculture still persist and agricultural production and productivity continue to decline. As a result, a question still persists on what causes such poor agricultural performance. The major assumption by this study is that the agricultural supply chain (production, processing and marketing support activities and services) should be analysed in order to identify areas that could be the major reasons for the agricultural stagnation. In order to do so, this study therefore, has examined the application of conceptual SCM model for coffee in Kagera region as a case. It examined the coffee supply chain in terms of production, processing and marketing support activities and services. Eventually, the study has proposed an appropriate conceptual coffee SCMM for Kagera Region.

The Region has been selected because it is the leading coffee producer in Tanzania. It also is where both Arabica and Robusta coffee are produced in large quantities. Similarly, coffee has been selected because it is historically accepted as a nationally political crop in Tanzania. It is the Tanzania's largest export crop that provides employment to more than 400,000 families in Tanzania. Its literature is credible as well as more available as indicated in Table 1.6.

Table 1.6: Tanzania Foreign Trade-Major Cash Crops 2008-13 (Tshs billion)

CROP	2008	2009	2010	2011	2012	2013
Coffee	15.2	83.6	92.8	143.3	124..1	150.0
Cotton	42.4	127.2	56.8	49.8	95.6	115.2
Sisal	6.9	8.2	9.3	7.4	18.5	-
Cashewnuts	43.4	54.2	62.7	33.8	82.0	-
Cloves	10.5	9.6	10.0	10.6	16.0	18.5
Tobacco	47.3	81.4	119.2	116.9	110.2	116.9
Tea	25.7	28.8	41.7	48.3	50.3	88.1

Source: National Bureau of Statistics, 2014 Exchange rate: 1 US Dollar=Tshs 1,320.03

1.7 Research Questions

In view of the statement of the problem above, this study posed the following research questions: -

i. Are coffee production, processing and marketing support activities and services significantly linked to allow application of SCM?
ii. Do coffee management institutions provide mandatory services to enable farmers to undertake support activities and services in the production, processing and marketing of this crop?

Deleted: support activities and services in

Deleted: institutions responsible for

iii. Are the marketing support activities and services significantly integrated along the coffee supply chain in order to enhance its marketing?

Deleted: coffee

1.8 Objectives of the Study

The general and specific objectives of this study were as follows:

1.8.1 General Objective

The general objective of the study was to examine the application of the conceptual SCMM in coffee support activities and services in the areas of production, processing and marketing in order to suggest an appropriate model to improve production and productivity of the agricultural sector. The ultimate goal is to enhance the income of the rural poor, alleviate poverty and raising the standard of living of the people in Tanzania.

1.8.2 The Specific Objectives

The specific research objectives were to: -

i. examine the status of application of SCM in support activities and services in production, processing and marketing of coffee;
ii. analyse the stus of coffee management institutions in provision of mandatory services to enable the farmers to undertaking of support activities and services in production, processing and marketing of this crop;
iii. assess the marketing support activities and services to find out whether they are intergraded along the coffee supply chain to enhance its marketing; and
iv. suggest the appropriate conceptual SCMM for coffee industry in Kagera Region.

1.9 Propositions

The study was guided by the following propositions: -

i. Coffee production, processing and marketing support activities and services are not significantly linked to allow application of SCM;
ii. Coffee Management Institutions do not provide mandatory services to enable undertaking of production, processing and marketing support activities and services for this crop; and
iii. Marketing support activities and services are not significantly integrated along the coffee supply chain to enhance its marketing

The study assessed and proved the soundness of the above listed propositions.

1.10 Scope of the Study

The study examined the application of conceptual SCMM in the agricultural sector in Tanzania with a focus on coffee as a true representative of the crop sub-sector. The area of SCM in agriculture has been selected because it touches a large number of the population in Tanzania. Furthemore, it is from the fact that little has been explored and adopted on this aspect in Tanzania's agricultural sector. In terms of both theory and method development, SCM is still at its infancy stage. An autonomous position stimulates the scientific development of chains and, therefore, may contribute effective and innovative concepts to the agribusiness studies (Beers, Beulens and Van Dalen, 2007). In addition, Al-Mudimigh et al. (2014) recognise SCM as a contemporary concept that leads in achieving benefits of both operational and strategic nature.

Staatz and Eicher (2009) argue that SCM in agriculture has been proposed because agriculture is the leading economic activity and it plays a passive role in development, it makes five important contributions to the structural transformation in developing countries; provides labour, capital, foreign exchange and food to growing industrial sector and is a market for domestically produced industrial goods. Thus, the sector supports the livelihood of the entire population due to its high linkage with non-agricultural sectors. The sector has unique and special qualifications in Tanzania as the engine for poverty alleviation.

This study has been narrowed down to crop sub-sector taking coffee as a representative of other crops. The crop sub-sector employs the largest number of rural population in Tanzania as most of the individuals depend on crops for livelihood than any other agricultural sub-sectors. Coffee has been selected for the current study because it is the leading cash crop that contributes an average of more than $115 million annually to the Tanzanian export earnings (Baffes, 2013). Table 1.5 shows that it has higher value than other exports of cash crops since 1994 in Tanzania. ICO (2012) and Ghoshray (2010) indicate that coffee is the world's second most traded commodity after oil. It accounted for trade worth approximately US $ 6.6 billion in 2011. Coffee is also a political crop and it is grown in more than 60 countries of the world. It is estimated that coffee provides a livelihood for some 25 million coffee farming families around the world, a majority of which are smallholders growing less than 10 hectares of land (Bitzer et al. 2008).

Thus, the scope of this research work is confined to the examination of the application of conceptual coffee SCMM in Kagera region because SCM is a multidisciplinary body of knowledge. This study adopts a case study research design in Kagera region in North-Western part of the United Republic of Tanzania.

1.11 Significance of the Study

This study will stimulate the country's efforts for improving agricultural services to farmers, thereby increasing production of cash crops as a means for income earning and fighting against poverty. The findings of the study will provide significant output as follows: -

(i) Identifying areas for interventions along the coffee supply chain;
(ii) Making suggestion on strategies for improving agricultural production, processing and marketing support activities and services;
(iii) Stimulating the private sector's participation in agricultural production, processing and marketing support activities and services;
(iv) Suggesting an appropriate conceptual SCMM in the coffee industry in Kagera;
(v) Fostering the agricultural sector development thereby raising the income and the standard of living of the people; and
(vi) Contributing to knowledge by adding to agriculture SCM literature to that existing in Tanzania and worldwide.

1.12 Research Methodology

1.12.1 Research Approach

This study adopted a case study approach. The approach was selected because the study had an exploratory research objective which is to provide insights and a comprehensive understanding of the problem confronting the researcher and the society at large. The case study research approach was applied with the intention of gaining an in-depth knowledge about SCM and to achieve new insights. In the context of this study, the idea was to get more insights about the application of SCMM which is expected to be applied in the agricultural sector in Kagera Region. The study selected a small geographical area and a limited number of individuals as the subjects of study. Thus, only coffee among the cash crops in Tanzania was selected for study while in terms of geographical location, only Kagera Region was selected among the eight coffee producing regions in Tanzania.

A case study approach is one of the most popular methodologies employed by constructive researchers (Yin, 2014). It is always concerned with understanding the case (phenomenon) in itself. Therefore, the focus is not on theoretical inference or empirical generalisation. The primary concern was not to control or influence the variables to determine behaviour, but to observe the study in its natural state. The study portrayed the basic

beliefs of the constructivist inquiry paradigm in terms of methodological approach which is hermeneutical or dialectical. Aaker et al. (2012) and Babbie (2007) argue that the case study approach therefore, provides an opportunity to the researcher to understand and make observations at hand rather than the theory. To that end, a case study design is essentially a reconstruction of individual cases around general consensus without the limitations imposed by the positivist inquiry paradigm.

1.12.2 Types of Data Collected

The research collected both primary and secondary data about coffee production, processing and marketing support activities and services. As regards to production, the main aim was to collect data to enable the researcher to examine the trend of volume and trend of coffee production. This was done by assessing the structure of the supply chain of inputs, extension services provided, level of technology being applied, irrigation facilities, gender aspect, capacity building (human and physical), research and development and early warning system. In the area of processing, the study focused on the volume produce processed for market, post-harvest losses, storage facilities, transportation and status of agro-industries. In so doing, the study was able to determine the amount of funds set for agricultural infrastructure, such as rural roads, transport, storage, types and volume of production in agro-processing industries in addition to packaging, quality control services, and branding and environmental aspect issues. Other areas included marketing information, prices, volume of exports, performance of co-operative unions and marketing boards, contribution of coffee to GDP. Their contribution to agricultural GDP and transport and communications facilities as mechanisms for marketing was also studied.

While primary data were collected through questionnaire completed by individual respondents, one-to-one interviews and observations, secondary data was collected through documentary records. In respect to the appropriate conceptual model, the collected data contained information that enabled the researcher to analyse the application of SCMM in terms of behaviour, process and institutions responsible for coffee production, processing and marketing support services in Kagera Region. During this exercise, the study collected time series data[1]

1 Time Series Data refers to the data that is collected over a period of time

1.12.3 Units of Inquiry (Site)

The main domain of investigation comprised of Kagera Region whereby the site included Regional Agricultural Offices, Co-operative Unions of Kagera Co-operative Union (KCU), Karagwe Co-operative Union (KDCU), Biharamulo Cooperative Union (BCU) and farmers associations in this region. The headquarters of Tanzania Coffee Marketing Board (TCMB) also was visited. In addition, the government ministries of Agriculture and Food Security, Co-operative and Marketing, Finance and Economic Affairs, President's Office-Planning Commission as well as Natural Resources and Tourism constituted the domain of investigations. Other sources of information covered libraries of the University of Dar es salaam, Sokoine University of Agriculture, the Bank of Tanzania (BoT), Economic and Social Research Foundation (ESRF), FAO and IFAD Tanzania country Offices, the Tanzania National Bureau of Statistics (NBS) and that of the University of South Africa at the School of Business Leadership (UNISA-SBL). In addition to those units of inquiry, the researcher visited Maruku Research Institute in Bukoba. Research assistants from this research centre accompanied the main researcher to various villages in order to conduct interviews with farmers and leaders of farmers' associations.

1.12.4 Instruments of Data Collection

During the data collection exercise, the study applied four main instruments simultaneously namely questionnaire, interview guide and or schedules, observation schedule/sheet and documentary records. The study designed questionnaire forms which were distributed and administered to selected respondents in order to obtain adequate primary information on the subject matter. Questions designed were both close and open-ended. In addition to this instrument, interviews were conducted to selected respondents. Interview schedules and guides were carried as companion to the researcher. Secondary information was obtained from important documents including agricultural production reports, trade records (imports and exports), budget speeches, rural-urban migration rate, the Tanzania Agricultural and Livestock Policy and economic bulletins. Library search and internet facilities by the use of computer were used to obtain more information. Observation was applied as an instrument for confirmation of information gathered through other instruments.

1.12.5 Methods of Data Collection

For triangulation purposes, this study employed survey, interviews and observation as research methods for collecting the required data. The survey was applied as a major method of collecting data by distributing questionnaires to various respondents in order for them to complete and return them to research assistants or

the principal researcher. The interview, often called “one-on-one” unstructured or structured conversation was conducted by the principal researcher. Although this technique of data collection is criticised for being more expensive than focus group discussion, this study considered interview as a purposeful exchange of ideas and it created good interaction between the interviewer and a respondent, which contributed so much to the completion of this research work. In addition, the observation method by use of observation guide or schedules was applied as supplementary method of primary data collection. This approach was purposely proposed in order to acquire background information on farming systems behaviour in the study area, especially in the villages of Kagera region as well as processing institutions and plants.

1.12.6 Sample and Sampling Techniques

In order to get a good sample, the study applied a combination of both probability and non-probability sampling methods. Regarding probability sampling technique, the study applied the stratified sampling technique while on the part of non-probability sampling technique, it employed quota sampling, purposive or judgemental sampling and snowball sampling.. The study chose probability sampling technique because it is where every unit in the population has a chance to be in the sample whereas non-probability sampling is a method where purposeful and qualified elements of the population are accurately determined (Purposive Sampling or Judgemental and Snowball Sampling). That is; the selection of respondents was based on the trust, their ability and knowledge about coffee SCM. Respondents or study population included farmers, leaders of farmers’ groups and associations. Other respondents were leaders of Co-operative unions and crop marketing boards, regional and district agricultural officers, representatives of processing firms and plants as well as government executives (Directors and Commissioners)

The sample size of this study was a total of 500 individuals out of the 152, 060 target population. From Kagera, the sample included a total of 355 respondents including 150 individual farmers, 50 leaders of farmers’ associations, 60 cooperative union workers and 30 officials in the government,20 from other coffee management institutions, 40 middle level officers and 5 executices of different organisations. Outside Kagera Region, a studycontacted a total of 145 respondents including 95 individuals in coffee management institutions and 50 government officials in the agricultural line ministries.

1.12.7 Ethical Issues

Ethical issues such as confidentiality and personalisation were carefully observed and taken into consideration throughout the data collection and analysis. During the interviews and filling of questionnaires, respondents were assured of confidentially. The questionnaires were designed in such a way that disclosure of the names of the respondents was optional to respondents. Likewise, during the treatment and consolidation of data the study used number codes to link the questionnaires and respondents. The researcher did not disclose the names of respondents to anyone outside the research team.

1.12.8 Limitations

The study was conducted in Kagera region North-Western Tanzania where it encountered a number of constraints such as inadequate transport facilities and poor infrastructure. Moreover, as mentioned in the literature review, SCM is a more technical area of study. Thus its concept and complexities in some cases were not clear to some of the respondents, especially rural farmers and peasants. The principal researcher and research assistants spent substantial amount of time to introduce and explain it to them. Another limitation was the use of technical language. The agribusiness jargons and terminology applied in the questionnaire forms were, sometimes, not well understood by some respondents thus reducing accuracy during the filling in of the forms which increased the possibility of respondents giving false information. Nevertheless, the researcher applied observation schedules to verify and justify correct answers.

1.13 Data Analysis and Presentation

1.13.1 Data Analysis Strategies

The study adopted a mixture of qualitative and quantitative analysis. The data was summarised by using the excel spreadsheet of the windows computer software, organised and summarised (descriptive and inferential statistics). The researcher applied Statistical Package for the Social Science (SPSS) for analysing the data. According to Chisnall (2011) and SPSS application guide (2009), SPSS offers marketing researches and other analyses a considerable and flexible means of analysing data. According to this guide, the use of SPSS for marketing research under the banner 2000 is a radical move towards simplification in usage of an open database. From this point of view, SPSS is viewed as a software package that offers data processing services for micros and spreadsheets of varying levels.

Therefore, the SPSS software was employed for coding and tabulation of data from questionnaire and analysing the collected data for drawing graphs (Bar and pie charts). Since coding of answers from the questionnaire is a very delicate and sensitive activity, the researcher undertook this activity independently.

Tabulation was done so that the tables were readily understandable and significantly appreciated. This entailed counting frequency of certain cases within classifications relevant to this particular survey. The qualitative data obtained from both primary and secondary data was described by using personal experience of the researcher. The information contained in the quantitative and qualitative data was compared with the literature available so as to come up with a fair and comprehensive analysis.

1.13.2 Findings Presentation

Number of tables and graphs (Bar and pie charts) were constructed to support the facts followed by qualitative description of the findings. The researcher prepared a number of attachments (annexes) to support and facilitate understanding of the facts. This type of analysis and presentation was adopted because it is simple and manageable. Some of the stakeholders are smallholder farmers and middle level elite class of Tanzanians. The thesis writing has been guided by the standard guideline of the University of South Africa for Doctorate of Business Administration (DBL).

1.13.3 Time Frame and Budget

A maximum of six years is the prescribed duration for DBL at the UNISA. The study has been completed within duration of five years period at the School of Business Leadership (SBL) which is within the specified time frame in the academic calendar of the University. The financing of the study was shouldered by the researcher himself according to the fee structure of UNISA. The students' bursary department of UNISA also supported part of the study activities. The supervision of the entire study was carried out by the promoter appointed by SBL.

CHAPTER TWO

THEORY AND PRACTICE OF SUPPLY CHAIN MANAGEMENT

2.1 Introduction

This chapter reviews both theory and practice of SCM discipline. It presents the background and CM development as well as the importance of integrating SCM in agricultural production, processing and marketing through behaviour, processes and institutions. It presents an overview on SCM in agriculture while specifically dwelling on crop production and its application in crop production, processing and marketing. It explains how this aspect is crucial and how it has been very fundamental in agricultural production, processing and processing in Tanzania and worldwide. Other important issues that this chapter covers are the role of governments, private sector and price in agri-products marketing. The review also explores the background and current status of agriculture in Tanzania. It presents statistical data on agricultural production and budget allocations for agriculture in Tanzania and in other countries. It also examines the economic importance and the current performance of agriculture in Tanzania. The chapter specifically focuses on coffee production, processing and marketing in Tanzania, particularly Kagera Region. The objective of this chapter is to present an in-depth review of literature and the justification for proposing a study on application of SCM in coffee agriculture in Kagera Region.

The literature surveys the past and the most recent SCM developments in order to outline the gradual evolution of the SCM discipline as a field of study. Some of the tables and figures in this study are deliberately adapted from the dated references (literature) in order to show the gradual development of the SCM discipline. Generally, this chapter describes, evaluates and integrates the content of relevant literature. Thus it seeks to reveal the existing gap between the theory and practice of SCM. Likewise, it identifies inconsistencies and contradictions in previous research, for the present study.

2.2 An Overview of Supply Chain Management Theory

CM has gradually become an area of interest to academics and business management practitioners alike (Chen and Pauraj, 2004). It offers many insights on how industries as well as the agricultural sector are organised. It draws on aspects of marketing, economics, logistics, organisational behaviour and management. CM presents a framework from the literature on economics, which may be useful for those interested in understanding and in exploring the concept of SCM. It further describes the origins and development of

transaction cost analysis and explains the key concepts of the framework. It discusses the potential effects of transaction costs on vertical co-ordination within an industry and hence SCM. Finally, CM suggests methods for empirical transaction cost analysis, providing recommendations for closer co-operation between researchers and business managers. Storey et al. (2006) view SCM as both an emergent field of practice and an emerging academic domain. Although neither perspective is fully mature, each has considerable promise. The future progress of each can be enhanced and, certainly, ultimately both depend upon each other.

According to Van Dalen (1997), chain theory deployment is an autonomous scientific discipline within the collection of scientific approaches to the chain phenomenon. This study indicates how chain science is similar to other sciences, with its own set of theoretical propositions, its own domain and its own methodology. Although chain science is not a mature branch of science, its autonomous position will stimulate the scientific development of chains thereby supplying business life with effective and innovative concepts (Beers et al. 1997). A number of fields such as purchasing and supply, logistics and transport, operations management, marketing, organisation theory and organisation behaviour, management information systems as well as strategic management contributed to the development of SCM literature. As Chen and Pauraj (2004) remark, research reveals a great deal of progress towards understanding the essence of SCM.

Researchers have directed their attention to the supplier-buyer relationship to identify the numerous theoretical determinants of SCM. The supplier-buyer link is of paramount importance to the effective management of the supply chain (Andersen et al. 1994). The relationship aspect of this link is a widely recognised area that has generated abundant scholarly works based on an extensive review of literature. This framework incorporates some key aspects of the supplier-buyer relationship such as base reduction, communication, cross-functional teams and supplier involvement. Otto and Katzab (2003) observe that there is a puzzling diversity of interpretations and understandings of SCM each with its own perspectives and leading to a specific goal.

SCM(SCM) has been one of the most powerful operations paradigms for improving organisational competitiveness both in manufacturing and services. Gunasekaran and Chung (2004) believe that many companies and other business organisations such as those in agriculture are working together based on shared values and a common goal of doing business to exploit a particular business opportunity. Specifying each partner's business model, their organisational and technical co-ordination and the appropriate criteria for agreements between them, can solve the problem of combining the different competencies of the partners. Table 2.1 summarises proposed different metrics referring to the main disciplines of SCM.

Table 2.1: Perspective to Derive the Goals of SCM

Perspective	Purpose of SCM	Focal Area of Improvement
System Dynamics	Managing trade-offs along the complete supply chain	Order management
Logistics	Integrating generic processes sequentially, vertically and horizontally	Integration of processes
Marketing	Segmentation of products and markets and combine both using the right distribution channel	Fit between products, channel and customer
Organisation	Determining and mastering the need to plan, budget, co-ordinate, manage and direct relationship	Intra-enterprise segmentation
Strategy	Merging competencies and re-locating into the deepest segments of the profit pool	Ability to partner, positioning in the chain

Source: Otto and Katzab (2003)

A number of fields such as purchasing and supply, logistics and transport, operations management, marketing, organisational behaviour and theory, management information systems as well as strategic management have contributed to the development and propagation of SCM theory. Chen and Pauraj (2004) assert that there is substantial progress towards understanding the essence of SCM. However, the new orthodox of SCM is in danger of collapsing into a discredited management whim unless a reliable conceptual base is developed. Accoring to Chen and Pauraj (2004), this situation emanates from the fact that, while research on various SCM relationships has been growing, there has not been a comprehensive approach to construct development and measurement. This could be largely attributed to the fact that astronomical efforts are required to undertake the development and validation of constructs and measures of SCM. Conversely, Hobbs (1996) and Katzab (2003) have highlighted the pressing need for clearly defined constructs and conceptual frameworks to advance the field of SCM.

Hobbs (1996) argues that in undertaking any research and analysis like this one on CM, it is helpful to have a framework that enables making of predictions about the likely outcomes of different business strategies and public policy initiatives. It should help observe business behaviour to be evaluated and, therefore, explain better the motivation for firms' behaviour and the consequences for efficiency within a supply chain. Thus we can use the developed conceptual framework to evaluate behaviour in agricultural businesses in Tanzania and motivate farmers accordingly. This research work proposes a theoretical framework for the study of SCM, which is drawn from economics literature. In identifying the numerous theoretical determinants of SCM, researchers have directed their attention to the supplier-buyer relationship.

Fostering and maintaining a superior relationship between the suppliers and buyers is a daunting task.This is probably why researchers and academicians are tirelessly working on SCM area, as is the case for this study.

Various forces play critical roles in making this a challenging business practice. The proposed framework includes only some of the key driving forces that have been identified from diverse SCM literature. Recognising this, the framework includes constructs such as competitive priorities, top management support, and strategic marketing in order to examine their effect on the effective management of the supply chain. Considering that a supply chain does not focus on only single firm according to Chen and Paulraj (2004), the framework adopts a theoretical definition of structure that focuses on the linked system of numerous organisations. Here one realises that the SCM construct has a supply network structure that reflects a decentralised, horizontal and non-power based structural link among the supply chain members.

However, with all the positive statements about SCM, researchers have come up with the negative side of it. Bello et al. (2004) have the opinion that the adoption of sophisticated SCM by trading partners in agribusiness in the global distribution channels is often limited by the institutional context of the international transaction. In particular, the regulatory, normative and cultural-cognitive elements of institutional environments around the world can enhance or inhibit the ability of trading partners to expertise the contractual, ownership and social element of institutional arrangements required by agribusiness. Since supply chain in agribusiness is often a costly activity, firms may be reluctant to participate in agribusiness unless new institutional arrangements are made to provide adequate safeguards and guarantees. Thus, in order to explore more about this problem, these researchers are proposing that a special conceptual model should be developed to explain the role of institutions in the successful employment of supply chain in agribusiness in the global marketing channels. Chen and Paulraj (2004) share the same opinion with Ellram and Carr (1994), Freeman and Cavinato (1990), Gadde and Hakansson (1994) that SCM is an integrative operation. Integration always occurs in terms of material supply, technology application and information flow.

SCM encompasses all three links identified in the framework. In this framework, a single construct of logistics integration is included to study the integration of information and materials along the supply chain. Furthermore, it is a well established that satisfying customer needs is the central purpose of any business (Doyer, 2002). His framework reflects the notion that customer focus in terms of satisfying needs and providing timely service is a key role of SCM. He equally indicates that SCM seeks to improve performance through better use of internal and external capabilities in order to create a seamlessly coordinated supply chain, thus elevating inter-organisational competition. Therefore, in the context of SCM, performance is no longer affected by a single firm rather the performance of all members involved contributes to the overall performance of the

entire supply chain. In this view, the SCM framework includes both supplier as well as buyer's performance. In particular, both operational (non-financial aspects) and financial indicators are considered.

Regarding the application of SCM by the top management of the organisation, Chen and Paulraj (2004) remark that the important role of top management has been greatly emphasised in the supply chain literature. They further observe that top-level managers have a better understanding of the needs of SCM because they are the most overseers of the firms' strategic imperatives to remain competitive in the market place. In addition, they note that top management is responsible in committing resources that will support suppliers. Therefore, farmers are the suppliers who are willing to be long-term partners of the organisations through suppliers' development.

However, some researchers have a different stance about the application of SCM in agribusiness. Bello et al. (2004) consider the adoption of sophisticated SCM in agribusiness as often limited by the institutional context of transaction. Specifically, the regulatory, normative and cultural-cognitive elements of institutional environments can enhance or inhibit the ability of agribusiness partners in including all the essential elements required by agribusiness. Since supply chain in agribusiness is often a costly activity, new investments and activity sets and firms may be reluctant to participate in agribusiness unless new institutional arrangements are made so as to provide adequate safeguards. Thus, as defined by the Supply Chain Council (2002), a supply chain encompasses every effort involved in producing and delivering a final product from the supplier's supplier to the customer's customer. It is from this point of view that SCMM, though commendable, may not be entirely reliable in every aspect.

2.3 Chain Science as an emerging Discipline

Since the 1990s, the interest for research on chain has increased. Ellram (1991) and Stevens (1989) agree that currently, researchers and managers that are dedicated to chains have been organising conferences on themes related to chains. Moreover, in organisations and in relations between organisations initiatives employees are taking initiatives in different places to experiment chain concepts. Within the context of this increased interest, several properties of chains have been discovered and several developments have been started. However, the development of the special but new branch of science dedicated to chains and chain behaviour is still at its infancy stage. It should be recognised that a study of an object is very much 'paradigm driven' which, in this case, is a coherent framework of theoretical concepts by operationalisation related to empirical observable variables (Beers et al. 1997). Several different aspects of the chain phenomenon

determine the three different dimensions focusing on chains. Principles, thinking and working are used to understand and interpret the observations. In relation to this, observations on the chain can be organised along the three dimensions of SCM namely behaviour, processes and institutions.

2.4 Chain Management as Integrated and Multi-Disciplinary Approach

According to Omta (2002), SCM integrates and balances the different dimensions in the overall research and development to establish production, processing, trade and distribution of high quality agri-products. To effectively address paradoxical demands facing the businesses, a multi-disciplinary approach from farm gate to kitchen table must be made between different aspects of production, processing, trade and distribution of agricultural products as represented in Figure 2.1.

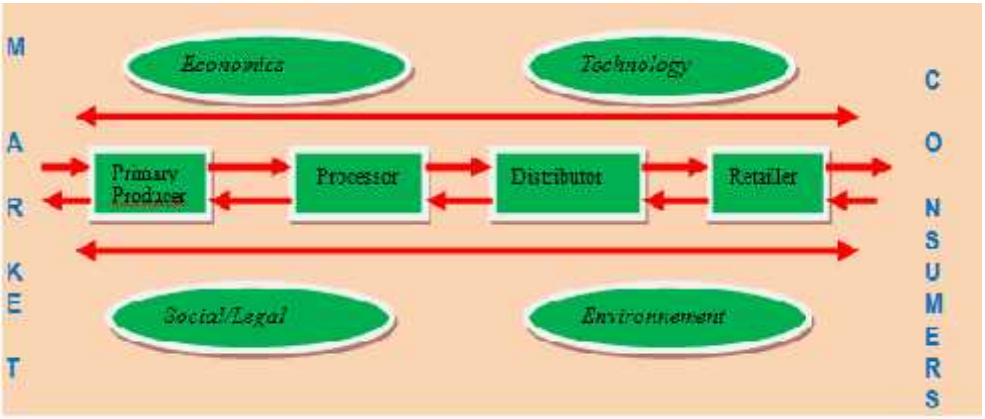

Figure 2.1: The Institutional View on Chains

Source: Beers, Beulens & Van Dalen, (1997)

Based on Figure 2.1, Omta (2002) believes that the system that covers the mechanism of demand and supply of agro-products should have a multi-disciplinary approach. These disciplines should represent different perspectives of production, processing, trade and distribution of products; they are complimentary in agri and food system explanation. From the diagram above Omta (2002) describes the following:-

- The Economics dimension is related to efficiency (in cost-benefit perspective) and to consumer orientation. To be effective and profitable, farmers must form alliances with other parties in the production column resulting in supply chain and networks.

- The Environment dimension is related to the way production, processing, trade and distribution of agri-products is embedded in its (ecological) environment. Issues are such as use of energy and energy emissions in production and distribution of products, recycling of waste and packaging materials and sustainable food production system.
- The Technology dimension is all about the way production, processing, transportation, information and communication technologies can be applied to improve production and distribution of quality products. The aim is to meet standards of national and international legislation and regulations, guide and control processes and provision of products and information to the public.
- The Social and Legal dimension (norms and values) is about societal constraints to production, processing, trade and distribution of agri-products to the human well being and social economic development. It focuses on legislation and secondary legislation (business norms and conventions regarding agri-products), consumer expectation and behaviour as well as international regulatory framework on agri-products.

As described in the definition, SCM seeks to integrate and balance the different dimensions in the overall chain in order to make critical decisions. It also seeks to develop and establish production, processing, trade and distribution of high quality agri-products. Some of the major decisions are:

2.4.1 Chain Management Decisions

Ellram (1991) and Stevens (1989) trust that CM decisions are classified into two broad categories namely strategic and operational. As the term implies, they believe that strategic decisions are made typically over a longer time horizon. These are closely linked to the corporate strategy (they are sometimes called the corporate strategy) and guide supply chain policies from a design perspective. On the other hand, operational decisions are short term, and focus on activities over a day-to-day basis. The main idea behind these types of decisions is to effectively and efficiently manage the product flow in the "strategically" planned supply chain. There are four major decision areas in SCM namely location, production, inventory, and transportation (distribution), and there are both strategic and operational elements in each of these decision areas.

2.4.2 Location Decisions

The geographic placement of production facilities, stocking points and sourcing points is the natural first step in creating a supply chain. The location of facilities involves a commitment of resources to a long-term plan. Once

the size, number, and location of these are determined, the possible paths by which the product flows through to the final customer are established. These decisions are of great significance to a firm since they represent the basic strategy for accessing customer markets, and will have a considerable impact on revenue, cost and level of service. According to Arntzen et al. (1995), these decisions should be determined by an optimization routine that considers production costs, taxes, duties and duty drawback.

2.4.3 Production Decisions

The strategic decisions also include what products to produce and which plants to produce them in, allocation of suppliers to plants, plants to distribution centres (DC's) and DC's to customer markets (Bello et al. 2004). As stated earlier, these decisions have a big impact on the revenues, costs and customer service levels of the firm. They assume the existence of the facilities, but determine the exact path(s) through which a product flows to and from these facilities. Another critical issue is the capacity of the manufacturing facilities as this largely depends on the degree of vertical integration within the firm. Operational decisions focus on detailed production scheduling. The decisions include the construction of the master production schedules, scheduling production on machines, and equipment maintenance. Other considerations include workload balancing and quality control measures at a production facility.

2.4.4 Inventory Decisions

Bello et al. (2004) and Lambert and Cooper, (2000) believe that inventory decisions refers to means by which inventories are managed. Inventories exist at every stage of the supply chain as either raw material, semi-finished or finished goods. They can also be in the process between locations. Their primary purpose is to buffer against any uncertainty that might exist in the supply chain. Since holding of inventories can cost anywhere between 20 to 40 percent of their value, their efficient management is critical in supply chain operations. It is strategic in the sense that top management sets goals. However, the decisions on inventory should take into account other aspects of the production process so as bring the true sense of chain management.

2.4.5 Transportation and Marketing Decisions

The chosen mode of transport and marketing decisions are more strategic in nature. Lambert and Cooper, (2000) trust that they are closely linked to the inventory decisions, since the best choice of mode is often found by trading-off the cost of using the particular mode of transport with the indirect cost of inventory associated with that mode. While air shipments may be fast, reliable and warrant lesser safety stocks, they are expensive.

Conversely, shipping by sea or rail may be much cheaper, but it necessitates holding of relatively large amounts of inventory to buffer against the inherent uncertainty associated with them. Since transportation is more than 30 % of the logistics costs, operating efficiently makes good economic sense.

The theory of SCM presented above suggests that it is a rapidly evolving area of interest to academics and business management practitioners. It further implies that SCM has been viewed as one of the most powerful operations paradigms or approach for improving organisational competitiveness both in manufacturing and services. As regardsthe application of SCM by the top management of organisations, Chen and Paulraj (2004) observe that the important role of the top management has been greatly emphasised in this managerial approach. Bello et al. (2004) feel that the adoption of sophisticated SCM in agribusiness is often limited by the institutional context of transaction. In particular, the regulatory, normative and cultural-cognitive elements of institutional environments can enhance or inhibit the ability of agribusiness partners to include all the essential elements required by agribusiness. The existence of these different viewpoints about SCM is a point of departure for this research work. It stimulates a debate on its relevance in agribusiness. It seeks to generate a balance model of SCM that may apply to the crop sub sector in Tanzania to improve production and productivity in it.

2.5 Definitions of Supply Chain Management

Various scholars have provided different definitions of SCM depending on the kind of problems addressed. Although there is no consensus, wherever there is a phenomenon labelled as 'chain' basically that means a network of connected organisations aimed at fulfilment of needs. As for the number of institutions providing services of the same product, specific organisations form a specific chain as an instantiation within the wider network (Beers, Beulens and Van Dalen, 1997). Here the actors appearing as participants of the chain are connected by precedence relationships. As Stevens (1989) reiterates, supply chains exist in both service and manufacturing organisations, although the complexity of the chain may vary greatly from industry to industry and firm to firm.

According to Ellram (1991), SCM is an integrative approach dealing with the planning and control of the materials flow from supplier to end-user. The elaboration made above shows that SCM is an approach aimed at co-operatively managing and controlling distribution channels relationships for the benefit of all parties involved to maximise efficient use of resources in achieving the supply chain's customer services goals.

Basically, SCM co-ordinates a network of firms interacting to deliver a product or service to the end customer, linking flows from raw material supply to final delivery.

Beers et al. (1998) define SCM as the series of entities that are managed or co-ordinated together in order to achieve better customer value with improved revenues at lower costs while satisfying a variety of constraints. This implies that SCM is a management technique that co-ordinates successive stages from primary producer to end consumer in a linked form. Therefore, SCM seeks to break down barriers existing between each of the links in order to achieve higher levels of service and substantial savings in costs. It also seeks to create relationships of mutual benefit by defining organisational structures and contractual relationships between buyers and sellers in which all parties are better-off than before.

Trienekens and Omta (2002) believe in the realm of Chain and Network Sciences (CNS) whereby SCM is defined as the management technique that takes on the composition of actors in business networks that vertically work together to add value for customers. They believe that SCM focuses on value creation and product flow through the chain from primary producer to the customer. By and large, SCM is defined as the integrated planning, co-ordination and control of all logistical business processes and activities in the supply chain to deliver superior consumer value. Attention is paid to the integration or harmonising of operational processes such as logistics and quality management, supporting processes such as ICT and transportation.

Ganesham and Harrison (1995) define SCM as an approach that manages a network of facilities and distribution options that performs the functions of procurement of materials and transformation of these materials into intermediate and finished products. It also deals with distribution of these finished products to consumers. They believe that the term SCM originates from the logistics discipline where it was defined in terms of all the constituent parts that make up the whole system. The parts include material suppliers, production facilities, distribution services and customers. These parts are linked together via the forward flow of materials and backward flow of information.

Tan (2001) argues that within the management sciences, two alternative perspectives on CM are the purchasing and supply school and the transportation and logistics school. The purchasing and supply school defines SCM as attempts by manufacturers to integrate partnership with their suppliers to more efficiently and effectively manage the purchasing and supply function. The transportation and logistics school defines SCM as attempts by the wholesalers and retailers to integrate the logistics function and partnership with their transportation and distribution functions.

Three important aspects are worth noting when discussing the CM and supply chain. The term 'chain' creates an impression that a supply chain is a linear and rigid arrangement of firms serving the final consumer. A CM in its real sense refers to the co-ordination of a system or network of firms interacting to deliver a product or service of superior value to the end consumer (Ellram, 1991; Zylbersztajn and Farina 1998). SCM is therefore applied in a form of a pipeline with uprooted trees where the branches and roots are an extensive network of customers and suppliers (Lambert and Cooper, 2000).Thus SCM is the management of the network of dynamic relationship that is constructed, deconstructed and revised as circumstances dictate. Figure 2.2 below is an illustration of coordination or management of the supply chain:

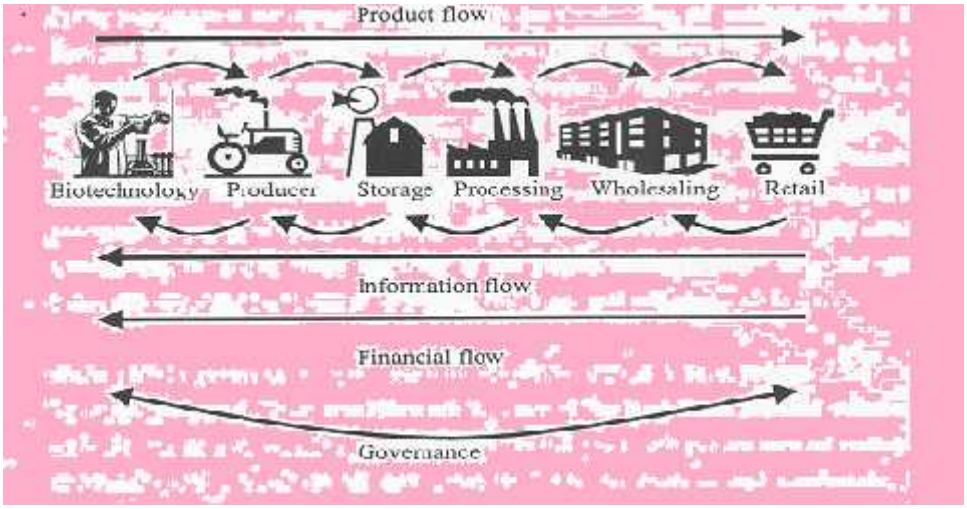

Figure 2.2: Supply Chain Management Coordination

Source: Trienekens and Omta, (2002)

In the agribusiness sense, Downey (2006) defines SCM as the process of bringing order to the system of producing, processing, distributing and marketing of food and agricultural products to consumers. From the consumer point of view, SCM focuses on improving the efficiency and effectiveness of the system to deliver safe and desirable products cost-effectively. From the supplier's perspective, Tienekens and Zuurbier (1996) define SCM as the system of management for creating organisation structures and linkages that will insure a strong position in the market and enhance their ability to generate healthy profits for equity holders. Therefore, it attempts to elucidate the system of linkages and interactions in the production, processing, and marketing of agri products. From the customer's perspective, Beurskens (2002) defines SCM as managing and aligning the

product, the processes and people with the customer's willingness to pay. The analysis of various SCM definitions as proposed by different scholars is summarised on Table 2.2:

Table 2.2: Analysis of SCM Definitions

AUTHOR	PROPOSED DEFINITION	REMARKS
Ellram (1991)	An integrative approach dealing with the planning and control of materials flow from supplier to end-user	It ignores the aspect of supporting each other at different stages of the flow of materials.
Beers et al. (1998)	Series of entities to be managed or coordinated in order to achieve customer value with improved revenues at lower costs while satisfying a variety of constraints	Looks at SCM as a management technique for coordination of links at lower costs, but it is more "profit oriented than service oriented technique" by focusing on revenue.
Trienekens and Omta (2002)	A management technique that takes on the composition of actors in business networks that vertically work together to add value to customers	It considers the aspect of networks but does not talk about efficiency or cost reduction strategy. SCM technique should be efficient, effective while delivering value and safe products to consumers.
Ganesham and Harrison (1995)	An approach that manages a network of facilities and distribution options that performs procurement of materials and its transformation into intermediate and finished products	It views SCM from the pure scientific point of view as it does not consider synergism among actors along the supply chain as well as customer satisfaction. It also ignores cost the reduction aspect.
Tan (2001)	Attempts by manufacturers to integrate partnership with their suppliers to more efficiently and effectively manage the purchasing and supply function	The Author considers the supply side only and leaves out the demand side. The definition does not take into account receiving feedback from the end user.
Downey (2006)	The process of bringing order to the system of producing, processing, distributing and marketing of food and agricultural products to consumers	It considers the partnership between service providers (suppliers) and consumers of services (buyers). Therefore, takes into account the so called 'business societal interface. It ignores the cost of service.
Beurskens (2002)	Managing and aligning the products, the processes and people with the customer's willingness to pay	It includes the three dimensions of the SCM; behaviour, institutions and process while leaving out the important aspect of service at lower cost.

Based on the different definitions of SCM as propounded by different scholars (see Table 2.2 above), this study has proposed a definition of SCM focusing on agribusiness which shall be applied throughout. This definition is a combination of facts as reflected in the definitions by Downey (2006) and Trienekens and Omta (2002). "SCM is the collaboration and coordination of actors in the supply system from primary producer to the final customer, to better satisfy consumer wants and needs at possible lower cost". This definition refers to the fact that SCM is the process of bringing order to the system of producing, processing, distributing and marketing of agri-products to consumers. Thus, SCM is just a system of integrating of all activities through proven supply chain relationships to achieve an efficient delivery of products and services and sustainable competitive advantage. In other words, SCM is the integrated planning, co-ordination and control of all logistical agribusiness processes and activities in the agricultural sector to deliver

superior consumer value products. Briefly, SCM includes the three basic dimensions of SCM namely behaviour, processes and institutions. Precisely SCM covers two main aspects to be precise that are management of individual links and management of all links from production to consumption in the chain perspective.

From the different definitions of SCM, the following is a summary form of the meaning of the study object: -

i. It is a co-operative process comprising association of actors (individuals as well as collective);
ii. It is there with the focus of managing the distribution channels, processes and relationships;
iii. It aims to bring order to the system of acquiring of raw materials (production), processing raw materials and delivering final products to consumers (distribution);
iv. It is there by means of organisational structure and linkages;
v. It improves the efficiency and effectiveness of the chain, ensures strong competitive position in the market and guarantees achievement of the predetermined goals and objectives along the whole chain;
vi. It ensures delivery of healthy and safe food to the consumers;and
vii. It creates customer satisfaction by rendering customer value, safe and healthy products.

2.6 Supply Chain Management in Agriculture

One of the aims of SCM in food industry and agribusiness is to feed people with food items that satisfy their demands (Trienekens and Zuurbier, 2000). The second aim is to satisfy the market demand for continuous flow of improved, safe and healthy products to the markets. Thus, squeezing the time for bringing these products to the markets justifies the need for efficient mechanisms for mobilising the competencies in the supply chain. These developments challenge the agricultural sector to embark on SCM.

According to Ortmann (2002), agricultural production and distribution systems in the world are undergoing major structural changes as a result of new information technologies, biotechnology, changing consumer demands in terms of product variety, quality, contents and safety as well as increased competition. Changing linkages between input suppliers and producers and between producers and those who purchase their products are key elements for the adoption of SCM in agriculture. Increased interdependence among all players in the food supply chain has major implications for the efficiency of food sector operations, the interdependence and power of various players in the chain and the sharing of risks and rewards. Ortmann (2002) gives an example of commercial farms where the number of linkages has generally increased as the farmers' source more inputs off the farms, including contract works.

Different aspects of SCM are explored in the agricultural industry with the goal of getting an overview of all the dimensions involved. These dimensions are considered in respect to their application and positive role they play in the marketing of agricultural produce. These dimensions represent the activities, processes and exchange between participants in the agricultural chains that have to be facilitated by the CM structures. SCM delivers the required product to the consumer thereby playing an important role in value creation. SM for a single product occurs where raw material is procured from vendors, transformed into finished goods in a single step and then transported to distribution centres and, ultimately, to consumers. Realistic supply chains have multiple end products with shared components, facilities and capacities. The flow of materials is not always along an arborescent network. Hence various modes of transportation may be considered and the bill of materials for the end items may be both deep and large.

Staatz and Eicher (1999) observe that agricultural development of the 1950s placed more emphasis on the American model of agricultural extension and the "diffusion model" of agricultural development. The model assumed that farmers could substantially increase agricultural productivity by allocating the existing resources more efficiently and by adopting agricultural practices and technologies from industrial countries. However, it was further discovered that the failure of many agricultural extension programmes to achieve rapid increases in agricultural output and the inability of community development projects to solve food problems in many developing countries like Tanzania, is the one led to reassess the diffusion model.

According to Staatz and Eicher (1999), one of the observations made during the assessment was the fact that in many developing countries there are structural barriers to rural development such as highly concentrated political powers and assets ownership. itwas discovered that farmers and herders had learned how to allocate efficiently the few and outdated factors of production such as old technology available to them. This implies that no appreciable increase in agricultural production could be realised by reallocating the factors at the disposal of farmers bound by traditional agriculture. Such case is is similar to the current Tanzania's environment where peasants use hand hoes in their daily farming activities. Staatz and Eicher (1999) viewed that the remarkable increases in per capital agricultural output in developing countries would come about only if farmers could be granted access to new and more productive factors of production (including new agricultural technologies) and the new skills on how to exploit them. They concluded that given the existing technologies, these farmers in developing countries such as Tanzania were "efficient but poor". They observed in the same vein that if that was the case and since the majority of the farmers live in rural areas, rural poverty lay in the lack of profitable technical package for farmers. Thus investment in human capital needed to cope

with changes in agricultural technologies. To that end, they proposed transforming traditional agriculture for a major shift from agricultural extension towards investment in agricultural research and human capital.

The overall objective of SCM in agriculture is to enhance the performance of production, processing and marketing systems through improved producer responsiveness to consumer demands as well as reducing operation costs along the supply chain (Ortmann, 2002). Meanwhile, Van Dalen (1997) identified two broad categories of objectives for SCM namely operating efficiency and strategic effectiveness. By operating efficiency he is referring to 'doing things right' by optimising supply chain operations to efficiently performing critical supply chain activities but at reduced costs. The objective of strategic effectiveness is focusing on 'doing the right things' through using the competencies of players along the supply chain in order to foster competitiveness of the new products, services and institutional arrangements.

Through cooperation and coordination of activities farmers and agricultural firms are able to realise advantages across the supply chain. (Doyer, 2002b) summarises these benefits of successful application of SCM in agricultural activities as follows: (i) reduced cost through specialisation (ii) improved synergistic performance (performance based on cooperation or integration) (iii) increased information to support joint planning (iv) enhanced customer services (v) reduced risks and uncertainty (vi) improved competitive advantage and (vii) shared creativity, brevity and skills.

2.6.1 SCM in Agricultural Production

SCM has been one of the major competitive strategies for enhancing productivity of any agricultural production related organisation. According to Gunasekaran and Chung (2004), in the recent years performance measurements and metrics have received significant attention from researchers and practitioners considering their role in the success of an organisation by implementing suitable strategies and technologies. Growth in agricultural production is necessary not only to increase food availability, raise the income of the people and nutritional level of the population but also is essential to the general social and economic development process ofa country. More precisely, Govereh and Jayne (2003) opine that the case for promoting export-oriented cash crops in Africa has generally been based on their direct potential contribution to agricultural productivity and small farmer incomes (this aspect will be clearly discussed under the case of coffee and maize in chapter five of this work). According to Colman and Young (1989), it is widely accepted that a prerequisite for rapid economic growth is the channelling of agricultural surplus (production in excess of own consumption) to the non-farm sector. They observe that a successful SCM in agriculture should focus on: -(i) factors that influence

the supply of agricultural outpu (ii) factors which govern usage of productive inputs (labour, fertilizer, machinery etc) (iii) efficiency of resource use and (iv) impact of technological change.

Colman and Young (1989) point out that in production theory, the main choices are what to produce (which product or combination of products), how much to produce (the level of output) and how to produce (the combination of inputs to use or and technology). They observe that this is focal point to the analysis of agricultural markets and formulation of policies aimed at motivating agricultural producers, mobilising resources in the sector and spreading new technologies. In the view by Govereh and Jayne (2003, production of high-value cash crops) represents one potential avenue for crop intensification. Evidence from other parts of Africa indicates that farm incomes and productivity can benefit from engaging in cash crops production with well developed channels for procuring inputs on credit and marketing the crop in question. However, Dione (1989), Goetz (1993), Von Braun and Kennedy (1994) and Kelly et al. (1996) remark that the active promotion of non-food cash crops in Africa is often impeded by perceptions that they compete with food production and exacerbate household food insecurity.

By using an example of Gokwe North District in Zimbabwe, Govereh and Jayne (2003) note that the effects of shifting to more commercial-oriented cropping patterns on the allocation of households' resource are complex and need to be more fully understood to guide agricultural policy formulation and implementation. This has indirect implication that it also needs application of SCM to integrate various issues related to cash crop production such as input supply, provision of credits, extension services as well as marketing. Therefore, the importance of SCM in production lies in these potential synergies between cash crops and food crops, which have previously been generally neglected in food crop research and extension programmes.

Taylor and Fearne (2006) document the literature concerning production management in the agricultural supply chain by elaborating that it initially appeared in the context of work on demand application. This area has a considerable body of literature ranging from the original presentation of the concept by Forrester (1958) and Burbidge (1961) to various articles describing the occurrence of demand application in different scenarios and industry sectors. A number of studies have used a systems dynamics approach to develop computer-based simulations of agricultural supply chain activity thereby testing various theoretical strategies to reduce demand application. Taylor and Fearne (2006) identify detrimental effects of demand application as excess inventory, poor agricultural production, difficulties in resource planning and increased production and delivery costs. However, more recently solutions for the phenomenon have emerged. .

Furthermore, Taylor and Fearne (2006) remark that studies on demand of agricultural production tend to highlight the need for and potential benefits of improved information management and timely transmission of demand data as a basis for developing closer collaboration across the supply chain. Considerable emphasis is placed on co-ordination and communication at the farm producer-customer interface and joint decision-making with respect to the demand forecasts, production scheduling, distribution and contingency planning. However, there is a widespread recognition of the supply chain implications of production demand management whereby very few authors discuss the practical difficulties of implementing the concept beyond the downstream buyer/seller dyad. Few studies have focused on a number of grocer supply chains albeit only in the context of dyadic relationships between single retailers and single suppliers and have emphasised that collaborative effort is paramount.

This conclusion Accordang to the definition of SCM adopted by this study, the SCM is very important in agricultural production. Production is among the aspects that need synergism in terms of developing improved seeds, usage of proper chemicals and manure, application of modern production technology such as agro-mechanisation and other extension services. Generally, the collaboration of these sub-elements brings sufficient production in the agricultural sector. The growth and development of SCM in agriculture is not driven onlyby internal motives, but by a number of external factors such as globalisation and international trade, information availability and environmental concern. The SC of a product consists of several links called actors. The examples of actors in agriculture are factories, farmers, transporters, marketers, wholesalers, and retailers as illustrated in Figure. 2.3

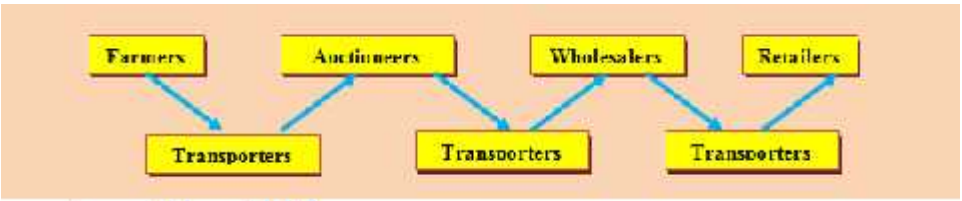

Figure 2.3: Examples of Actors in the Agri-Chains

Source: Gigler et al. (2002)

In non agri-chains, each actor performs operations, which intentionally alter or modify the product characteristics in such a way that the product reaches the end-user according to target specifications. According to the research by Gigler et al. (2002), the product characteristics can be represented by one or more product states. During the transportation and storage processes, nothing happens to the product states. For instance, necessary actions for a computer in a supply chain can include computer assembly, software

installation, packing in a box, adding cables to the box, labelling, transportation and storage at the wholesaler. The actions that take place in non-agri chains are called handling (actions which alter or modify the state of the product) and transportation and storage (actions that do not alter the state of the product).

The origin of the supply chain concept has been inspired by many fields such as the quality revolution, notion of materials management and integrated logistics as well as a growing interest in industrial markets and networks. Others are the notion of increased focus and influential industry-specific studies (Chen and Pauraj 2004). Thus researchers find themselves immersed in terminologies such as supply chain, demand pipelines, value streams, support chains and others. The term SCM was originally introduced by consultants in the early 1880s (Oliver and Webber, 1992) and has subsequently gained tremendous attention.

However, an important feature for agricultural products is product quality, which is continuously liable to changes. In agri-chains, this continuous process is referred to as quality development. Accordingly, in agri-chains there are three types of actions namely: - (i) Handling: intentionally altering or modifying the appearance of the product (ii) Processing: - intentionally altering or modifying the quality state of a product and (iii) Transporting and storing: - intentionally or unintentionally not altering the quality of the product. The control of processes during handling, processing, transportation and storage of a product is what is called SCM. It is there because the chain consists of several pre-defined actors (see Figure.2.4) whose positions in the chain are fixed. Thus chain optimism represented by SCM refers to the construction or management of the routes by defining which actors should perform which actions in order to achieve the total chain costs while achieving the predetermined goals and objectives. Nonetheless, in most cases the supply chain in developing countries is fragmented in such a way that there is coordination in some segments only while others are not coordinated at all. The coordinated segments such as marketing and production are not linked with processing segment thus causing the break of the supply chain. Therefore, a thorough assessment is required so as to explore the underlying factors for this state of affairs.

All governments finance agricultural sectors through the development and dissemination of new technologies. As research results are disseminated through the education and extension services, they generate improved productivity and add to the supply pressures, already severe in many cases (OECD, 1987). As it can be observed, agricultural policies have rarely taken into account the fact that such changes in technology and productivity add to the downward pressure on agricultural prices. In so doing, therefore, they play a very important role in the overall supply-demand balance and hence influence the trade situation in the longer term.

2.6.2 SCM in Agro-processing Activities

Gradually SCM has become a topical aspect in agro-processing industries as agricultural organisations begin to appreciate the crucial importance of creating an integrated relationship with their suppliers and customers as well as all other beneficiaries of the same supply chain. The concept is quite prevalent in agro-processing industries in that processing of agri-products increases its value for a better chance to compete at the market place. VCM in relation to agro-processing industries is the model concept whereby supply chain becomes only a sub-set. It is concerned with managing integrated information about product flow, all the way from supplier to end-use. It is included in the agro-processing cycle in order to reduce defects in inventories, speed up the process, achieve time to market and improve customer satisfaction through producing quality items. according to Al-Mudimigh et al. (2004), SCM in agro-processing primarily is concerned with the customer from start to finish activity.

Numerous benefits that could be accrued from adopting the principles of VCM in agro-processing have been identified. Al-Mudimigh et al. (2004) classify them as organisational, economical and strategic competitive benefits. The authors argue that VCM provides agro-processing industries with the opportunity to develop their value proposition. In other words, these industries have to identify their core competencies and position themselves in the market place according to their strengths and competitive abilities. Secondly, it provides an opportunity to establish chains that create value and drive out cost and bring in customer needs and wants. Using different approaches, Al-Mudimigh et al. (2004) argue that this is about developing synergy levels and seamlessness, between the various activities involved in converting the customer needs into tangible outputs.

Another benefit of VCM that depends on application of SCM in agro-processing activities includes development of partnerships with suppliers and with other stakeholders. Technology enables agro-processing organisations to network on a wider scale and ensures that the customer is better served. The cost reduction advantage is another benefit, which can be accrued from focusing on the customer in value creation. According to Dumond (2000), optimising activities and establishing inter-dependency (that is adoption of SCM) between the various processes can drive out costs through quality improvement and optimisation. Thus, in agro-processing, SCM can be applied by linking activities such as product development, supply management, transport, warehouse, inventory management, category management, store management as well as customer relationship management.

Demand for agricultural processing industries output is derived from the needs and wants of the consumers. It is crucial also to examine the strategies employed by food processors to target specific groups of consumers and the means by which processors inform and persuade consumers through product promotion. Connor and Schiek (1997) argue that designing strategies to meet consumer demands does not occur in the vacuum. Product development and manufacture is dependent on the availability of inputs and the means of managing the cost and quality food processing inputs. This is important because change in product forms can reduce the preparation time for consumers, increase palatability, storability and convenience. In other words, agro-processing is crucial through the use of factory systems to add economic value by transforming products grown on farms.

Connor and Schiek (1997) also argue that adding value to farm products and other material ingredients is the way in which the agro-processing industries contribute to the firm's and country's economy. Moreover, they argue that the principal economic function of agri-processing is to convert various agricultural products into finished products. However, the economic contributions do not end there. Agricultural products processors perform a number of value-added economic contributions that are shared with agri-marketing companies such as farm product assemblers, grocery wholesalers, transporters, retailers and agricultural product service providers. Elman and Andersson (2008) believe that on-farm processing may offer an alternative for diversification, income generation and rural development through promotion of deregulated agricultural markets. This point is in line with the suggested general objective of this study on raising income of the rural poor.

The nation's agricultural processing industriesis often taken for granted as aan unremarkable and invisible feature of the economic landscape. Perhaps these industries are viewed as commonplace because they use old methods of production. Processing factories appear as small scale while processed food products seem to be familiar as to be routine or processing is believed to be a small step beyond the farmer's field. It must be accepted that crop processing has been linked to agriculture or domestic household activities. Many processing industries were originally part of the farm operations (such as butter or cheese making) or skills found in the kitchen such as pickling and baking. Some agro-processing (such as flour milling) are indeed of ancient, but the methods and equipment are in use today together with technologies in place (Connor & Schiek, 1997). Thus theauthors conclude that agri-processors are typically in the sole position to formulate and design foods, taking into account consumer preferences, distributor's demands and ingredients availability, scientific knowledge of biological properties, technical feasibility and profitability as their complex but critical task. Agri-processors share some of the quality information through ingredient labelling and other programs

that assist consumer services in SCM. Last but not the least, through quality control and product testing, agri-processors assume much of responsibility to protect the safety of the national agricultural product supply. Thus, agro-processing of agricultural products involves activities such assembling of farm products, transportation, storing, collecting, studying and forecasting of information supplies, product development and manufacturing as well as linking with marketers and consumers. In view of this, co-ordinating such activities, organisations need application of SCM.

2.6.3 SCM in Agricultural Marketing

Bradley (1995) and Kotler (2000) define marketing as the management function responsible for identifying, anticipating and satisfying customer requirements profitably. Therefore, marketing is both a concept and a set of techniques, which address such matters as research, product design and development, pricing, packaging, sales and sales promotion, advertising, public relations and distribution and after-sales services. In accordance with academic practice, marketing is defined as the business activities associated with the flow of goods and services from production to consumption.

Marketing of agricultural products begins at the farm, with planning production to meet specific needs markets prospects. Marketing is completed during the sale of products to consumers. He explains further that, agricultural marketing also includes the supply to farmers of fertilizers and other relevant inputs for production. Marketing tasks and responsibilitiesmay be summarised as: -(i) finding a buyer and transferring ownership (ii) assembling and storing (ii) sorting, packaging and processing (iii) financing of marketing and risk taking and (iv) assorting and presenting to consumers (Abbott, 1987).

In order for marketing to fulfil its role of stimulating and extending development Kotler (2000) adds that the specific firms must be responsible for finding domestic as well as foreign markets for the produce. "They must be able to arrange assembly from farms, packaging and presentation in appropriate containers, sorting according to consumers' requirements, transport to consumers' depots or markets, storage to extend the availability of seasonal commodities and process to extend the time and range of sales outlets" (Kotler, 2000). Implicitly, marketing firms must possess the financial resources, marketing and managerial skills, qualified sales and technical personnel, together with the initiatives and willingness to accept business risks. These are necessary prerequisites to perform marketing responsibilities and tasks efficiently. In export marketing, or in substitution for imports in domestic markets, they must be able to match the competence of rival enterprises in other countries.

It is clear now that currently the business is feeling the pressure of over-capacity and increased competition thereby the application of efficient marketing system is of paramount importance. According to Xiangtong et al. (2004), in to be successful in marketing of agricultural products, the importance of integrating SCM cannot be overemphasised. It is therefore from this point that if we agree that marketing of agricultural products begins at the farm gate and ends at the sale of farm product to the consumer.Then the whole chain requires the application of SCM.

From Hill and Ray (1987) we learn that marketing of agricultural and food products is viewed either as a commercial activity carried out by farmers and food companies along the food chain or as an area of concern for policy makers in government. It can be noted that successful marketing in agriculture requires organisational integration where individual farms and food firms are unable to provide sufficient integration; we may expect to see integration imposed by the commercial expansion or the government. This is because the concept of marketing involves all those concerned with research, development, design, production, finance, distribution, after-sale services as well as the labour force. There are special features that make agricultural marketing different from other forms of marketing. There are a large number of small farm businesses each supplying almost the same product. Many of these farms are limited to a few production possibilities and individual farmers are rarely in a position to apply the marketing principles. Instead they rely on joint action through co-operation or crop marketing boards. It can be learnt from other countries such as Spain and Italy where farms are much smaller. In these countries marketing disadvantage is significant.

Another unique feature in agricultural marketing is the existence of agricultural and food chain. This can be analysed in a number of ways and a mixture of three of the more popular approaches can be adopted. One way is to concentrate on the institutions in the market (the firms, co-operative unions and Marketing Boards), whilst a second approach is to look at particular commodities and the channels of distribution. A third approach is to identify which functions are being performed in the agricultural and food chain, functions such as buying and selling, storing and processing, financing and risk-bearing. Hill and Ray (1987) conclude that marketing in agriculture is performed at three levels namely farm gate, processing and retail levels. In practice, many firms and other organisations dealing with agricultural products add value to them at all stages of the chain.

Temu and Winter-Nelson (2002) indicate that liberalised crop marketing is an incentive for production of export crops by reducing the costs of transforming products through space, form and time. As liberalization leads to cost reduction in output exchange, they argue that it can remove opportunities for linked input-output transactions that sometimes lower the costs of providing finance in crop marketing. The study on liberalisation

in the Tanzanian coffee market came out with the results showing the declining of costs in output marketing, rising transaction costs for financing farm activities, and differential, but generally positive, net impacts on farmers.

Bingen et al. (2003) reviewed marketing reforms adopted in china that have recognised the role played by free market in increasing efficiency of resource allocation, production and productivity in agriculture. However, it did so without first changing the basic institutional framework within which actors operated. Chinese farmers produced primarily for family consumption but percentage of grain marketed through non-planned channels reaching 20 percent of total marketed grain in the late 1980s. This is an exemplary move that may be adopted by farmers in other parts of the world including Tanzania.

2.6.4 The Role of Government in Agricultural Marketing

The economic development process of most developing countries depends on commercialisation of agricultural products. Commercialisation increases the marketed surplus and encourages more transfer of agricultural products from producers to consumers. In Tanzania, the agricultural marketing system has substantial impact on the economy as it supports employment, food production and exports (Ashimogo, 1995). Ashimogo contends that factors affecting marketed surplus in 'peasant' (smallholder farmer) along the supply chain in agriculture are broadly classified into three main categories namely household factors, including family size, education, consumption habits and farm size. Others are economic factors such as producer prices, income levels, and the price (interest rates) and availability of credit, consumer goods and input supply to farmers and finally state intervention in the agricultural sector particularly in grain marketing arrangements.

A far-sighted government will orient its overall policy framework towards growth of those enterprises that are able to take on the necessary marketing responsibilities and will establish and maintain a favourable economic and political climate for this to happen. Major factors according to Abbott (1987) include freedom to operate a marketing enterprise, access to banking, transport and other facilities, maintenance of reasonable law and order, and confidence in their continuity. The governments through regulatory action and support services can assist the development of a free working marketing system. Most governments also sometimes impose direct intervention for the public interests. Marketing services proceeds more smoothly and cheaply when the central and local governments are able to protect those involved.

Castano (2001)proposes that the provision and maintenance of railways, airports, roads, bridges and other facilities for transport together with telecommunication services, are basic requirementsfor marketing that are

expected from the governments. Not only that but provision of organised markets such as local assembly, wholesale, retail at convenient places is a similar central or local government's responsibility. Further more he asserts that the collection and dissemination of marketing information on crop prospects and prices as well as supplies in producer wholesale and retail markets are also recommended because it can be undertaken on behalf of all market participants than on individual basis. These are complemented by banking services for financing marketing operations (Castano, 2001).

As regards to marketing problems facing the agricultural sector, Verhaegen and Van Huylenbroeck (2001) proposed the establishment of Farmers' Markets in order to increase the income of farmers not to reinforce or unify the domestic quality characteristics of the products. The central authority organising the market does not intervene in the actual transactions while the market committee has the jurisdiction of acting as daily management only. They also proposed that farmers should have a full autonomy to decide on their own activities, which means they have high power incentive and use autonomous adaptation mechanisms. However, they stress that despite being characterised as weak, the governance structure of Farmers' Markets is sufficient enough to create a framework to allow the Farmers' Markets transactions to take place and to realise the economies in transaction costs.

Castano (2001) observes that in developing countries marketing imperfections result in the distorted use of resources because market signals such as demand (reflected by prices) and market risks, transmitted via the market channels and received by resource-users such as farmers, do not fully reflect the market panorama amd that those market imperfections likely mislead farmers towards inappropriate farm decisions with respect to resource allocation and use, cropping mix and long-term sustainability. Thus, identifying a strategy that addresses and corrects market imperfections and guides adequately farm-resource decisions is definitely fundamental for the long-term continuance of small-farm system in developing countries.

Castano (2001) notes that researchers embrace the point of poverty and uneven market access on agricultural sustainability and the lack of more proactive role of marketing in targeting sustainable agriculture. The need for a market-based agricultural policies for environmental issues and the enhancement of marketing channels (in terms of infrastructure, organisation and coordination of functions) to target environmentally sound agricultural production systems are also crucial. Furthermore, the potential contribution of SCM on agricultural marketing needs to find alternative answers for its contribution to poverty problems in developing countries. Verhaegen and Van Huylenbroeck (2001) observe that the agricultural sector has been confronted with several evolutions where agricultural policies are gradually shifting to rural policy which in turn gives the necessary support

(agricultural services) to competitive enterprises in areas that are naturally suited for an agriculture enterprise competing in the global market market. In this regard, governments are looking for alternative forms of agricultural production, food consumption, new supply channels and new rural products that reflect the need for SCM.

2.7 Coffee Supply Chain Management

Coffee is a political crop as it is grown in more than 60 countries worldwide URT and World Bank (2004) suggest that coffee is produced in more than 50 developing countries of which most of them are tropical countries. Latin America accounts for about 60 percent of the global output followed by Asia (24 percent) and Africa (16 percent). Brazil alone produces about 28 percent, Colombia 10 percent and another 10 percent by Vietnam. During the 1970s and 1980s, the coffee output grew by 2.0 and 1.6 percent respectively. In the 1990s, coffee production fluctuated at around 100 million bags with virtually no growth until the latter part of the decade when it increased to 113 million bags annually. It is estimated that coffee provides a livelihood for some 25 million coffee farming families around the world the majority of which are smallholders using less than 10 hectares of land (Bitzer et al. 2008). This study concurs with Cole (2008) that coffee played a major role in global capitalism for about five hundred years. Along with tobacco, sugar, cocoa, silver, gold, and coca, coffee was one of the original and foundational commodities of global capitalism.

The history of coffee growing and drinking in the world started in the horn of Africa, Ethiopia, where the coffee tree originated in the province of Kaffa. It is no longer any doubt that the coffee plant originated in Africa (ICO, 2004). Arabica coffee comes from Ethiopia and is still found in wild populations in the undergrowth of the high Abyssinian plateaux. The history of coffee in Africa goes back to the pre colonial period when early white explorers (Speke and Grant) found robusta coffee planted near the homes of the Baganda (Ugandans) people when they first visited Uganda in 1862. They found that Africans had the habit of using coffee in their ritual ceremonies. They also chewed dried berries of robusta coffee particularly during arduous campaigns or long journeys.

Coffee belongs to the botanical family Rubiaceae with more than 6,000 species (Cole, 2008). Most of them are tropical trees and shrubs that grow in the lower storey of forests. ICO (2004) suggests that other members of the family include the gardenias and plants that yield quinine and other useful substances. However, coffea is the most economically important member of the family and was discovered by Linnaeus in the mid 18th Century. According to this organisation, there are about 25 species that are indigenous to tropical Africa. All

species of coffea are woody but they range from small shrubs to large tress over 10 metres tall, the leaves can be yellowish, dark green, bronze or tinged with purple. Coffea arabica (Arabica coffee) accounts for about 70 percent of the total world production and coffea canephora (Robusta coffee) produces about 30 percent of the total coffee world's out.

Coffea arabica and coffea robusta are the two principal varieties of the genus cultivated all over the world for commercial purposes. Two other species, which are grown on a small-scale, are Coffea liberica (Liberica coffee) and Coffea dewevrei (Excelsa coffee) (Petit, 2007). He explains that coffee has traditionally been grown under the canopy of the towering forest trees or inter-cropped fruit trees such as bananas, citrus, or leguminous pod trees, that produce other valuable food, timber, fuel wood and fodder crops. However since the 1970s, coffee plantation has been dramatically changed with regard to crop pattern and practices, mainly to meet the high demand of coffee, and to tackle the leaf fungus. With the development of hybrid coffee varieties, 'shade-coffee' has turned to become 'sun-coffee'.

The global coffee chain has gone through a 'latte revolution' where now consumers can choose from (and pay dearly for) hundreds of combinations of coffee varieties, origin, brewing and grinding methods, flavouring, packaging, social content and ambiance (Ponte, 2002). Likewise, Bitzer et al. (2008) state that since the 1960's, the coffee sector was governed through the International Coffee Agreement (ICA), which established a target price for coffee and allocated export quotas to each producing country. From this point he clarifies it that the global coffee chain from producers to consumers has dramatically changed as a result of deregulation where new consumption patterns and evolving corporate strategies have emerged. Ponte (2002) made a very systematic study of coffee chains in order to explain the spatial organisation of its production, trade, and consumption in the globalised world economy. According to Ponte (2002), the coffee chain in this context is seen as "a network of labour and production in process whose results is a finished commodity" whereby processes in the coffee chain are linked together in networks therefore we can see a coffee chain as a set of interorganisational networks clustered around this one commodity only.

2.7.1 Coffee in the World Market

The importance of coffee as one of the agricultural commodities in the world economy cannot be understated as it is one of the most valuable primary products in world trade (Pandey et al. 2000 and ICO, 2004). Baffes (2003) indicates that more than 80 percent of coffee is traded internationally and consumed mainly by high-income countries. The analysis of the ICO (2002), Ghoshray (2010), and Baffes (2003) indicate that coffee is the second most traded commodity after oil. It is an important commodity in the world economy accounting for

approximately US $ 5.6 billion annually. Its cultivation, processing, trading, transportation and marketing provide employment to more than 100 million of people worldwide. For many developing countries, exports of coffee account for substantial part of their foreign exchange earnings of over 80 percent. According to ICO (2004), coffee is a traded commodity on major centres and commodity exchanges, mostly importantly in London and New York.

On average, about seven million tons of coffee is produced yearly. Brazil is the largest coffee producer as indicated on Table 2.3. Furthermore, according to Petit (2007) and Ponte (2012), in 2005/2006, 52 per cent of world production was accounted by the three main coffee producers (Brazil, Colombia and Vietnam), Brazil currently supplying about a third of the total production. The top five consumers are USA, Brazil, Germany, Japan and France, while the Nordic countries have the world's highest coffee consumption per capita. ICO (2004) suggests that the supply of coffee is likely to be constrained in the future because overall global prospects for coffee prices are not promising leaving Brazil and Vietnam as the only efficient producers. The fact that coffee price is so volatileand the emergence of Vietnam as the major robusta producer, is likely to influence robusta prices for many years.

Table 2.3: Coffee Production in the World

Country	Brazil	Colombia	Indonesia	Uganda	India	Cote d' Ivoire	Vietnam	Mexico	Ethiopia
Coffee Production (Mil. sacs)	28[a]	15[a]	7[r]	5.5[r]	5[r]	5[r]	5[r]	4[a]	4[a]

Source: Ponte (2012)

Key; a- refers to Arabica, r-refers to Robusta

URT and the World Bank (2004) observe that the demand for coffee is positively affected by number of factors and identify them as a small segment of the market focusing on product differentiation, such as organic, gourmets and shade coffees has emerged. Moreover, there is a new technology that is enabling roasters to remove the harsh taste of arabica and robusta coffees. For these two reasons, the document suggests that the potential exists for demand to expand at two ends of the spectrum namely the lower quality coffee (which can be enhanced through improved technologies) and speciality coffees.

2.7.2 Coordination of Coffee Industry

According to Kessy (1990), ICO governs the coffee world market. This is the main intergovernmental organisation for coffee that aims at bringing together producing and consuming countries to tackle the

challenges facing the world coffee industry through international cooperation. It makes a practical contribution to the world coffee economy and to improving standards of living in developing countries. ICO was established in 1953 when the first International Coffee Agreement (ICA) came into force in 1962 for a period of five years, and it has continued to operate under successive agreements negotiated since then. The 1962 Agreement was negotiated in New York at a Conference held under the auspices of the United Nations (UN). The successor agreements include the ICA of 1968 (and its two extensions), the International Coffee Agreement of 1976, 1983 (and its four extensions). Others are the 1994 Agreement (with its one extension) approved by the Council for a period of five years beginning October 1994, and the current Agreement of 2001. All agreements were negotiated at the headquarters of the ICO in London. The United Nations remains the only depository authority.

The role of ICO is to bring about international co-operation on coffee marketing and contribute to the stabilisation of the price of coffee. The function of ICO is to stabilise prices in order to satisfy all main stakeholders including producers, consumers and industries. Thus, ICO has been effective instrument for the regulation of the world coffee markets. Getting ahead to international coffee markets, URT and the World Bank (2004) propose an increased in farm productivity so as to off-set the secular declines in global coffee prices, production of superior quality of coffee, in order to take advantage of higher price premiums, and expanding into differentiated markets to take advantage of the corresponding price premiums including appellation, gourmet, or sustainable coffees (the latter includes organic, fair trade, and eco-friendly or shade coffee).

Ponte (2002) points out that the analysis of the coffee production; processing and marketing chain is of particular importance to understanding of the political economy of development for a number of reasons. For example, over 90 percent of the coffee production takes place in developing countries and larger consumption mainly takes place in developed or industrialised countries. In has beenargued that the production-consumption patter provides insight on North-South relations. Second, for most of the post WW II period, coffee has been the second most traded commodity after oil. Third, attempts to control the international coffee trade have been taking place since the beginning of the 20th century making coffee one of the first regulated commodities. Fourth, a number of developing countries, even those with small share of global export market, rely on coffee for a high proportion of their export earnings. Coffee is the source of livelihood of millions of smallholders and farm workers worldwide. Fifth, producing countries historically treated coffee as a strategic and political commodity, therefore they have been either directly controlled domestic marketing and quality control operations or have strictly regulated them –at least until market liberalization took place in the 1980's and 1990's.

As reported by various scholars including Ponte (2002), Muradian & Pelupessy (2005) and Bitzer, Francken and Glasbergen (2008), the governance structure of the global coffee chain has been transformed in the transition between the two regimes namely ICA regime (1962-890) and the post-ICA regime (1989-present). The two regimes have been selected for simplifying the analysis of the Global Coffee Chain (GCC). It is further argued that during the ICA regime, the coffee chain was not driven by any actor, nor was it possible it was controlled by the producing or consuming countries. Entry to farming and domestic trade was mediated by the respective governments while the international coffee trade was regulated by the common agreements. However, contrary to that according to Punte (2002), analysis of coffee value chain indicates that ICA regime exhibits many of characteristics of a buyer-driven chain meaning that consuming countries are controlling coffee chain.

Muradian & Pelupessy (2005) highlight that in the GCC analysis, the term coordination is applied instead of SCM. The term 'coordination' is often used for describing non-market relationships between firms in different segments or between external and internal parties in the chain. Therefore, in the context of this study the term coordination describes the exchange of non-market information, capabilities, and activities among actors of the commodity chain that are not linked through ownership. They likewise go into detail stating that 'coordination' is meant to ensure particular product (coffee) specifications, including performance, processes and logistics. Thus this study learnt that 'coordination' is likely to be a tool in coffee chains involving suppliers in developing countries and buyers in industrialised countries as it is the better way of ensuring reliable transactions and minimise risks, heterogeneous production conditions, technological advancement and stable financial systems that are common in developing countries. Thus from Ponte (2002), it is learnt that GCC approach provides useful tools for the analysis of commodity markets. It examines how key agents build, co-ordinate and control the linkages and flow of produce between producers and consumers and the roles played in this process by firms, financial service providers, and business services at large. Generally, it pays attention to the organisational aspects of the SCM it terms of the whole range of activities from primary production to final consumption and the linkages binding them. Inter-segment coordination in coffee chains according to Coe (2006) and Ponte (2002) may take a number of varieties of forms, but the most common that may be considered as possible simplified classifications include:

i. Market transactions - typical arm's length transactions with low or missing coordination; low information exchange, mediated mainly by prices and standards attributes of products;
ii. Weak coordination – complex, no specific information exchange, low monitoring costs;

iii. Strong coordination – considerable, complex and specific information exchange, high monitoring and switching costs with likely mutual dependence ;
iv. Vertical integration – complex and very specific information (most of the time confidential ones). Standards, processes and logistics are controlled through acquisition of ownership in the chains.

Besides the usage of the term 'coordination' in Global Commodity Chain analysis, Bitzer et al. (2008) reports the use of the term 'Governance' along the coffee chain thereby shedding light on the transformative potential of partnerships in the global commodity chains. Governance in the context of GCC refers to the power of relationships between actors and the way financial, material and human resources are allocated along the coffee chain. Bitzer et al. (2008) find that the chain is governed if all the firms set and or enforce the parameters under which other actors in the chain operate. Thus governance guides four parameters that influence the entire supply namely, (i) what to produce (ii) How to produce it; (iii) When to produce it and (iv) How much to produce.

Coe (2006) has explored the documented examples of coordination and governance represented by the recent wave of market deregulation in various developing countries that have altered economic policy environment that farmers face. His assessment indicates that since the early 1990s, the role of the governments in directing the coffee market has declined in almost all coffee producing developing countries. For instance, in Malawi the National Coffee Association is represented through the Smallholder Coffee Farmers' Trust, a privatised national farmers' association representing a country's minority small farmers. The Association has focused on developing a Rural Coffee Farmers Savings and Credit Organisation and improved extension services in order to market Mzuzu Coffee as a special coffee product. The second example has been cited from Costa Rica where FEDECOOP, the national Farmer Cooperative Association, has received training to use price risk hedging strategiesto protect investments involved in production of high quality Arabica coffee.

The third example is in Tanzania, where the Association of Kilimanjaro Speciality Coffee Growers through their participation in the coffee farmers' association that consults the national TCB , became the first group to receive special permission from the government to bypass mandatory auction and export directly. Coe (2006) notes that some of the farmers of the Kilimanjaro Farmers Association managed to market their coffee at prices 66 percent higher than farmers who went through government auction. Another scenario whereby farmers secure market benefit through the coffee authority by instituting direct market controls is in Kenya. The Coffee Board of Kenya runs mandatory weekly auction and the licensing of marketers in the auction is dominated by farmers groups. These groups have constantly limited the provision of market licenses to

maintain the farmers' advantage over marketing in the auction. Such examples are witnessed in Arabica producing countries such as Papua New Guinea and Cameroon. Forthe Coffee Authority of Philippines, farmers are claimed to be members of the task force of the Philippines National Coffee Development Board although they do not appear on the actual list of members of the Task Force. Only government ministries, coffee retailers, rosters and exporters are present. The structures of these authorities allow the government or private sector players to seek market benefits for themselves at the expense of farmers. Thus, in all these casesimproved extension services, access to credits and market training are secured through producers (farmers) participation in the coffee authority,which has led to the higher coffee quality output as well as higher coffee prices for all links in the coffee supply chain.

The presentation of made on coffee SCM above has revealed that coffee is an important commodity in the world's economy. It also provides employment to many people worldwide. The assessment shows that final coffee processing is mainly taking place in developed countries not in developing countries. This indicates weak processing technology in producer states implying that coffee is sold in raw form. Apaert from the weak or absence of regional integration, coffee price remains one of the biggest challenges in the coffee supply chain. This poses a challenge to multiple actors along the supply chain. Therefore, there is a need to assess the institutions responsible for processing, governing, financing and managing coffee productionin order to establish reasons for this weakness on the coffee supply chain.

2.8 The Agricultural Sector in Tanzania

The documented agricultural sector in Tanzania can be traced back to the colonial days. Although direct production was left largely in the hands of private sector, the colonial government had a keen interest in big agricultural schemes for export crops especially for the industries in the metropolis. Agricultural activities in Tanzania were based on the development of plantation crops such as coffee, sisal, cotton, tea and cashew nuts. Research programmes were aimed at solving the problems facing the plantations. The manufacturing sector was contributing only 40 percent of the GDP whereas the great share (about 60 percent) was mainly from agriculture. According to Kapunda (1998), the basic role of the public sector was largely administrative and provision of infrastructure.

The Tanzanian agriculture has experienced rapid changes in policy direction and priorities during the last 50 years, that is, within the life span of many farmers, pastoralists and farm workers in the countryside. State supported white settler farming in the colonial era in contrast to promotion of indigenous smallholder farming

and parastatal large farms (Mbilinyi and Nyoni, 2000). From 1980's, traditional cash or export crops from small-scale farmers contributed significantly to cash crop production especially the case of cotton, cashew nuts and tobacco and supplemented by estates in some crops such as coffee, tea and sisal.

According to Kapunda (1998) and Kilima et al. (2000), agricultural co-operative unions in Tanzania with their roots in the credit and consumption society in Rochdale, United Kingdom during 1844, were the main agents in the previous period. Crop authorities replaced Co-operative Unions in 1976. However, co-operative unions were re-introduced in 1984 in order to revitalise the rural marketing system. However, according to Msambichaka and Naho (1995), changes in the marketing system of food crops and export crops altered the environment within which the farmers operated and affected their access to food security. Liberalisation policies removed government price supports to smallholder growers and opened up crop marketing to private traders by creating a multi-channel market. Public marketing agencies disengaged from food trade including National Milling Corporation (NMC) and the Strategic Gain Reserve (SGR) remained the only public organisation to acquire large quantities of maize. Mbilinyi and Nyoni (2000), observe that market liberalisation had some positive effects such as an increased in the number of private traders operating in the countryside. This was an incentive for farmers to produce more crops.

2.8.1 Importance of Agriculture in Tanzania

The importance of agriculture in Tanzania cannot be overstated [URT, 2001(b), Mlambiti and Isinika, 1999]. The sector remains a key pillar of the Tanzania's economy in many aspects. The Government is promoting agriculture because it is the surest way to eradicate poverty in the country (Sato, 2002). MoFEA (2009) also highlights that apart from enhancing diversification of the economy given its enormous potential, it stands a better chance of spurring economic growth to new level; it also provides employment, food for the population and rural development thereby substantially contributing towards poverty reduction. Therefore, increasing agricultural production to achieve food security, higher incomes and sustainable economic growth remains as the central challenges facing Tanzania. Intensification marketing of agricultural products, with consideration of Tanzania situations is vital for ensuring that the country is self-sufficient in terms of food supply and production of other products from the sector (Falusi, 2001).

There have been measures with the objective of leaving agricultural production, processing, and marketing to be influenced by the market forces. Kahama (2004) notes that there has been unreliable performance since

the private sector have taken over agribusiness left by the government. However, the Tanzania 1997 Agricultural and Livestock Policy among others has the following salient features: -

(i) Liberalisation of markets and removal of state monopoly in export and import of products and inputs;
(ii) Withdrawal of the government from actual agricultural production, processing and marketing;
(iii) Promotion of private sector in production, processing and marketing of agri-products as well as importation of inputs;
(iv) Assurance of national food security and food self-sufficiency; and
(v) The roles of the government remaining formulation of policies, regulation, and supervision of agribusiness.

In the ASDS URT (2001a), Mbiha et al. (1998), Kurwijila (1999) indicate that the trends in poverty reduction are dependent on the growth of agriculture and related non-agricultural activities. The recent studies by the World Bank and IFAD (2002) indicate that about 50 per cent of Tanzanians can be categorised as poor. This means that they have per capital income of less than one US dollar per day and are earning up to three times less than people living in urban areas. The studies also indicate that about 90 per cent of the poor live in rural areas and depend on agriculture for livelihood. This implies that improvement of farm incomes and related activities of the rural population is a precondition for poverty reduction in Tanzania. Unfortunately, however, agricultural production has remained low, growing at the rate of 3.5 percent over the last decade compared to population growth rate of about 2.8 percent. Poverty in Tanzania will decline with growth in rural incomes, and rural incomes will not grow without improving production and productivity of the agricultural sector and agribusiness (URT, 2001b).

Secondly, food insecurity is often a manifestation of poverty. Studies on the state of food security in Tanzania indicate that food insecurity at household levels is due to lack of access to nutritious food. Estimates indicate that about 42 per cent of households experience food shortage. Food price fluctuations put the poor community in a more uncertain condition. URT (2000) suggests that any strategy to address food security must involve actions to improve agricultural production, availability, stability and accessibility to food. It emphasises the quality and quantity of marketed agricultural products as a key to improving incomes and alleviating poverty among the rural poor. In Table 2.4 the data indicates the contribution of agricultural sector to the economy in Tanzania.

Table 2.4: Contribution of Agriculture to the Economy (in %)

Years	1990/93	1994/98	1998/00	2007/08	2008/09	2009/10
Contribution to GDP	48.4	50.0	50.0	25.8	25.7	24.6
Contribution to Foreign exchange Earnings	56.0	56.2	54.2	15.3	15.1	14.9

Source: Ministry of Agriculture and Food Security (2014)

Third, over ten years, agriculture has been the single largest contributor to GDP and foreign exchange earnings (see Table 2.4). Another recent study by the World Bank (2000) concluded that agricultural growth linkages (multipliers) in Tanzania were higher than those of other sectors that are felt in both the rural and urban areas. It is due to these factors that agriculture remains as the economic 'engine' in Tanzanian. According to Mahalu (2004), the importance of agriculture in economic growth and poverty reduction in Tanzania makes it a priority for investment and development. He underscores the need for the URT with its development partners to work on:

i. Designing and restructuring the nature, scope and extent of agricultural support systems such as extension, research, training, regulations, information and farmers' organisations;
ii. Constructing rural infrastructure such as roads, markets, market information systems and development of agro-processing industries; and
iii. Expanding small cost-effective water control and management systems for irrigation.

The government of Tanzania places a high priority on reducing poverty and food insecurity. Achieving this objective is closely linked to the improvement of performance of the agricultural sector because Tanzanian farmers are the ones who supply all of the food consumed in the country (World Bank, 2001). At international context, FAO (1987) observes that agriculture has the multiplier effect when there is a rise in prices of farm products and of rural income on non-farm incomes. An example given by the Organisation focuses on research results that indicate that a one- percent addition to the agricultural growth rate in India stimulates a 0.5 percent addition to the growth rate of national income. In totality these statement indicate how important agriculture is to the entire economy of any country in the world.

in 2001, Tanzania approved the ASDS . This is guided by the principles of PRS, the RDS, and the TDV 2025. ASDS focuses on agricultural productivity and profitability by creating a favourable environment for investing in agriculture (MAFS, 2002). It also aims at promoting private sector participating in agri business and processors and grower partnerships, and the implementation of ASDS through District Agricultural Development Plans. In

2001 the government approved the ASDP as a tool for implementation of the ASDS. This was a five-year programme but its implementation will be rolled into a three-year MTEF. The priority areas under ASDP include seed multiplication, crop protection, soil and water management, irrigation, market development, agricultural finance, agro-mechanisation, agro-processing and producer organisation.

2.8.2 Performance of Agriculture in Tanzania's Economy

URT (2002) indicates that agricultural sector recorded a growth rate of 4.0 percent in 2007 compared to 4.5 percent in 2000. Recent statistics by MoFEA (2009) indicates that the sector accounts for about 24 percent of the GDP, 17 percent of exports and employs about 80 percent of the rural population. According to Mlambiti and Isinika (1999) and the World Bank (1994), real growth in agriculture parallel to GDP growth from 1966 through 1992 with agriculture averaging 2.8 percent and GDP growing at 2.7 percent per annum. Agricultural growth was 45 percent lower than the GDP rate in 1966 to 1975 and 65 percent lower in 1976-80. Agriculture began to recover in the early 1980s but GDP growth was still negative. From the 1983/94 period, agricultural growth increased relatively faster enhancing to overall growth of GDP and hence per capital income. With the onset of the agricultural-led reform programme in the mid 1980s the sector's share in the GDP started to pick up from 42 percent in 1983 to 48 percent in 1998 at 1992 prices. Data from the World Bank (2001a) indicates the indices of agricultural production for selected preferred and drought staples, as well as industrial crops for the period 1965-92 taking the year 1980 as the base.

According to the Ministry of Finance (2002) performance of the agricultural sector has not been impressive in recent years. Agricultural GDP has grown at 3.3 percent per year since 1985, the six main food crops at 3.5 percent and export crops at 5.4 percent per year. Other components of agriculture such as livestock and forestry have recorded lower growth rates. The Ministry wonders specifically when considering that the overall GDP growth target for halving abject poverty by 2015 is in the range of 6-7 percent, this performance falls short of the needed growth. URT (2001) reports that between 1990 and 1993, the annual growth rate of the sector declined drastically from 6.7 percent to mere 0.4 percent before rising to 6.6 percent by 1995. In 1996, the annual growth rate was down to 4.6 percent and it declined further in 1998 to 2.3 percent. The sector's growth rate made a modest improvement to 4.1 percent in 1999. URT (2002b) indicates that another unsatisfactory performance of the sector is further indicated in 1999, its share of the GDP was Tanzania Shillings 31.7 billion, equivalent to only 44.3 percent of the overall GDP of Tanzania Shillings 71.5 billion. Agricultural GDP declined in real terms between 1985 and 1998 as its dominant components namely crops and livestock grew at 2.2 percent lower that the population growth rate of 2.8 percent.

Overall performance of agricultural sector in post-reform period according to World Bank (2001) estimated that agricultural GDP grew at 3.5 percent per year over1985-90 and at 3.3 percent per year over 1990-98, thus recording an average rate of 3.3 during the entire period. Observation of the Bank in the early period indicates that food crop production grew quickly in response to domestic market liberalization while export crop production remained stagnant. Since 1990, food crop production growth has slowed down to approximately the rate lower than the rate of population growth while export crops posted an impressive 7.7 percent rate of growth.

One of the economic policies affecting agriculture in Tanzania is public expenditure on agriculture (MoFEA, 2009). The way government finances the agricultural sector through its annual budget indicates that the real value of budget allocations to the Ministry of Agriculture and Co-operatives (MAC) currently the Ministry of Agriculture and Food Security (MAFS) since the Fiscal Year 1990/91 has been inadequate. For example, the real allocation in 1997/98 is about 33 percent of the average of annual value in the 1991/92 to 1993/94 periods. There is some recovery of the agricultural budget in the 1998/99 budget and estimated 2001/02 budget. Even so, the 1999/00 budget was almost 33 percent lower, in real terms than the average of the allocations in the first three years of the period. The declining share of research and development is worrisome for future productivity growth in agriculture. This is because of the decline from 25 percent to 30 percent in the early years to an estimated 12 percent in the 1999-2000 budget. The agricultural sector budget trends indicated by MoFEA (2009) indicate that in the 2008/09 and 2009/10 budgets the sector being an engine of the economy, received relatively smaller budget allocation. MoFEA (2009) further indicates that the sector received 3.2 and 5.0 percent also 5.4 and 11.7 percent for recurrent and development budgets for 2008/09 and 2009/10 respectively. This allocation for agricultural sector was 4.0 percent and 7.0 percent of the total public budget for the year 2008/09 and 2009/10 respectively. In this regard, public expenditure on agriculture is one of the crucial areas affecting agriculture in Tanzania.

Furthermore, the findings in Table 2.5 indicate that there is a sharp drop in the development budget as a share of total in the 1990s. The local development budget drastically declined from an average of 17 percent of the sector expenditures in 1990/92 up to only 2 percent in 1996/98. External financing for the agricultural sector is incorporated in the development budget, and has also decreased significantly since 1994/95. The share of external support to budget of MAC declined from 60 to between 10 and 20 percent. This implies an even larger drop in absolute funding since the total budget for MAC declines absolutely. Therefore, the falling share of government spending on agricultural sector activities exacerbates the trend as illustrated in Table 2.5.

Table 2.5: Budget Allocations to Agricultural Sector from 1990/91 to 1999/00 in Tanzania in %

Budget Item	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00
Administration	10	10	10	5	4	9	13	29	32
Crop Development	47	39	44	47	55	49	48	34	36
Research & Development	25	34	22	30	18	10	15	15	12
Co-operative Development	6	5	6	3	4	5	9	4	4
Food Security/grain reserve)	0	0	7	5	6	12	11	3	3
Livestock Development	12	12	12	9	13	16	4	15	13
TOTAL	100	100	100	100	100	100	100	100	100
Total Vote (Mil. Tsh)	64,432	71,001	62,696	63,252	40,161	26,420	21,829	37,047	44,421

Source: Ministry of Agriculture and Food Security (2002) Exchange rate: 1 US Dollar=Tshs 876

Note: (i) Allocation by sector indicates only recurrent expenditure
(ii) Total Vote includes recurrent and development expenditures

Having cited some examples on how the government in Tanzania supports agriculture through its budget, it is also important to compare with other countries. The various types and forms of support to agriculture enable the governments to intervene throughout the agricultural chain, from research activities right down to the consumption stage. Intervention takes in spheres such as development of agricultural techniques, disease control, structural improvements, price and income support, improving the processing system and marketing as well as consumption aid. Table 2.6 indicates budget expenditures of different countries and regions of the world showing how much in financial support to the agricultural sector.

Table 2.6: Public Expenditure Related to the Implementation of Agricultural Policy

Country	Agric I		Agric II		Agric III		Agric IV		Agric V	
	Mil ECU	%	MilECU	%	Mil ECU	%	Mil ECU	%	Mil ECU	%
USA	814.0	4.2	542.2	8.2	1607.8	8.3	1,0581.1	54.6	3,548.7	22.3
Canada	173.5	10.6	66.6	4.1	151	9.3	243.6	14.9	847.7	16.6
Australia	217.0	46.4	84.5	18.1	28.0	6.0	32.8	7.0	101.4	11.9
New Zealand	49.7	19.9	44.7	18.0	71.5	28.7	0.2	0.1	83.1	26.2
Japan	340.3	3.3	36.3	0.4	3,861.3	37.9	163.2	1.6	4465.8	24.1
Austria	13.9	2.9	_	_	125.6	25.9	9.0	1.9	335.9	3.4
EEC	1,268.5	6.0	454.8	2.2	5,125.2	24.2	2,163.9	10.2	12,008.9	30.0

Source: OECD (2007)

KEY

Agric.I Research, Training and Advisory Services
Agric. II Inspection and Disease Control Services
Agric III Rationalisation of Production, Improvement of Structures and Rural Development
Agric IV Processing, Marketing and Consumer Aid
Agric V Price and Income Support

2.8.3 Agricultural Marketing in Tanzania

The liberalisation of agricultural input and output markets after 1986 brought ended decades of state control that had seen uneven growth of national food crop markets, large falls in traditional export production and an increase in subsistence and rural poverty. According to URT (2005), a great part of agricultural business in Tanzania consists of small operations, managed by owners with few fixed investments. They are small and personalised in the sense that in most cases, the owner is also the manager of the day-to-day trading operations. Other characteristics of agri-products trading are that few trading firms invest in transport. There is little use of telecommunications in this trading, low storage capacity and many traders attempt to sell immediately after purchase. There is also little access to credit facilities, which makes farmers face shortage of working capital. The document indicates that mostly cash crops are grown principally for market and not for household consumption or in the absence of markets, just left to rot thereby causing mass post harvest losses. The main markets for cash produce are located in the major urban centres. However, marketing of these crops is characterised by a large number of traders and middlemen dealing with small amount of non standardised and ungraded commodities (there is no quality control). In most areas of the country marketing channels for cash crops produce are not organised with inadequate marketing system.

According to Mbiha et al. (2004), marketing of agricultural products begins at the farm when the farmer plans production to meet specific demands and market prospects. This is a complicated process that so far has not been adequately incorporated in the tools used by change agents in agriculture. Figure 2.4 depicts the typical agricultural marketing chain and identifies the position of agricultural marketing in the whole process. It indicates that most efforts are still directed at increasing production without considering that this is only one component of the supply chain. The authors emphasise that to be able to increase their welfare and incomes through marketing strategies, farmers require the best production and input supply and markets systems and as indicated in Figure 2.4.

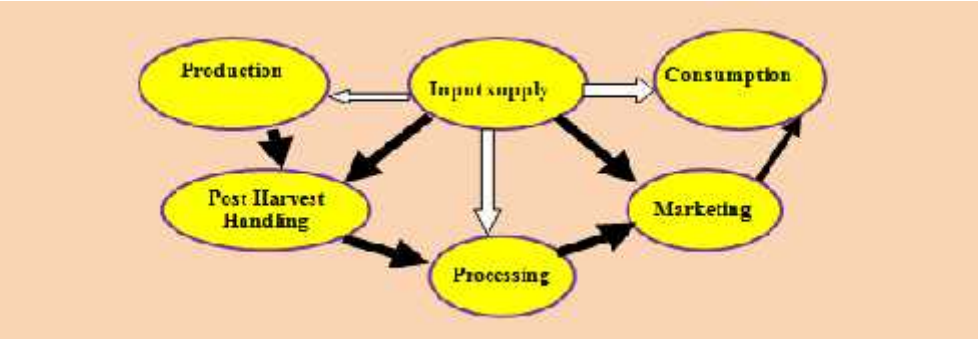

Figure 2.4: The Agri-products Supply Chain System

Source: Mbiha et al. (2004)

According to Mbiha et al. (2004), the post harvest system in Table 2.5 above encompasses a diversity of activities including research, extension, production, processing, distribution and marketing that span the continuum from the field to the plate. Major technical concerns of the sector include preventing product losses and ensuring good quality through proper handling, quality control and storage because market information is crucial for an efficient post harvest sector. Appropriate technology supported by proper institutional arrangements (policies, incentives and infrastructure), adequate marketing, distribution and commerce are crucial. Therefore, the post harvest section includes areas of (i) on farm pre-treatment and primary processing (ii) distribution (iii) processing, which includes research and development aimed at developing or adapting appropriate technologies as well as other factors that develop small and medium sized rural enterprises such as policies, incentives credits and market information (iv) storage infrastructure and technology (v) marketing and commercialisation, which require appropriate policies and incentives as well as institutional support and knowledge of markets and (vi) consumption patterns and consumer preference.

However in practice, the theory of SCM is partially implemented in Tanzanian agricultural system. For instance, neither actor's collaboration for on farm treatment and primary processing nor coordination of post harvest handling carried out for ensuring quality of the crops before storage and secondary processing. This is an area of concerned and where the supply chain is broken. Actors that need coordination are clearly indicated in Figures 2.4 and 2.5. Undertaking comprehensive study in order to find out what are the likely reasons for this circumstance and possible solutions.

Export crops marketing has witnessed co-operatives and crop boards failing to cope with liberalisation thus leading to loss of substantial market share. Crop purchasing has been taken over by private sector, with some co-operative unions operating, albeit under stiff competition with private players though with drastically reduced access to financial institutions credit support. A recent study by FAO (2012) indicates that export crop growers have not fully captured the potential benefits of their production regime despite operating under a liberalised market scenario. Various export crops are characterised by different and changing arrangements, thus generalisation needs to be qualified. Arrangements have not provided adequate incentives to growers and enhanced marketing efficiency in general. Gross inefficiency has been noted in the production-marketing system of export crops. These constraints have increased costs and reduced revenues in the input-output markets thereby preventing the realisation of potential income gains by export growers.

The above assessment was made to the agricultural sector from SCM point of view, its performance in terms of growth rates, contribution to the GDP, foreign exchange earnings, income to the households and total livelihood of the country's population. One would see that it may be difficult in this sector to justify its position as 'the engine of the economy'. For example, its shares to the GDP was 27.6 percent in 2005 but it dropped to 25.0 percent in 2009 and 24.0 percent in 2010 (MoFEA, 2010a and MoFEA 2010b). Growth rates of the sector declined from 5.9 in 2004 to 4.6 percent in 2009 (FAO & MAFSC, 2008 and MoFEA, 2009) while its shares to total export declined from 28.0 in 2003 to 17.0 percent in 2009. For a sector like agriculture which is employing more than 80 percent of the rural population and 70 percent of the entire country's population, one would notice a challenge to the so called 'a pillar of the economy' which needs a thorough but critical assessment. Essentially, these and other shortcomings portrayed by this sector show the gap and have generated the motive for conducting this research study.

2.9 Practices of Coffee SCM in Tanzania

This section is an outcome of the literature reviewed with the aim of laying a strong foundation of obtaining sound information through questionnaires, interview and observation schedules during the exercise of data collection. The section is necessary for wrapping up as it is backed by the theories of the New Institutional Economics (NIE) and the empirical references suitable for application of SCM in coffee production, processing and marketing in Tanzania. It seeks to develop the path in respect of proper application of SCM in coffee. It intends to help understand the dynamics of the forces needed for change in the institutional

structure for designing and proposing an appropriate coffee SCM for Kagera region. Some authors[2] feel that there is no one best way to apply SCM in agriculture. In fact, rules governing the SCM must be devised, tried, modified with resources being invested in learning how various institutional rules affect application of SCM.

Transaction costs for coffee production, processing and marketing in Tanzania are embedded in a long time dominated public sector which has developed in response to commitment failure, resulting from poor technology, weak financial base, inadequate market information, inadequate regulation and weak legal enforcement mechanisms. For example, coffee must be physically present at the time of transaction so as to be virtually inspected before being exchanged. Traders and farmers have delicate financial base and limited access to public financial and market information systems that would enable them know the availability of credits and prices at different markets.

The study developed the problem tree in Figure 2.4 which considered the analysis made above. It is a key instrument for analysing the exiting situation in coffee production, processing and marketing in Kagera and Tanzania at large by identifying the major problem, the causes their causal relationship. The problem tree has produced a visual representation of the analysis of constraints confronted in coffee sub sector in Tanzania. Along with the problem, there are causes and effects of the problem. Like any other tree, the problem tree indicates three main parts; the trunk, roots and branches. The trunk is the core problem (inadequate application of SCM Techniques). The roots represent the causes of the core problem (lack of good policies, volatile financial services and lack of institutional arrangements). The branches represent effects namely, inadequate extension services, poor technology and weak marketing services.

2.9.1 Causes for Inadequacy of SCM

The causes for inadequacy in the practices of SCM in coffee sub-sector areas follows:

i. Poor Agricultural Sector Policies

The study noted that there has been weakness in various policy formulations, analysis and implementation in Tanzania. Isinika et al (2005) reveal that since independence, Tanzania has striven to pursue pro-food production policies . However, the weak capacity in policy analysis led to many unintended effects, often

2 See the literature contained in Ostrom (1990).

undermining the primary objectives of government policies. It further explains that in many cases, political concerns such as party supremacy and a strong egalitarian bias in government policy outweighed economic considerations. This study established that most of trade related, agricultural, financial, marketing and training policies did not emphasise commercial agriculture.According to URT (2012), commercial banks credit to various sectors in Tanzania increased from 965,985.9 million in 2003/04 to 1,219,305.6 million in 2004/05, which is equivalent to an increase of 26.2%. However, most of the credit was extended to trade, manufacturing, transport, construction and tourism instead of agriculture as indicated in Table 2.7:

Table 2.7: Credits by Commercial Banks to Sectors from 2009 to 2012(Tshs million)

Sector	2009	2010	2011	2012	Change in 2011/15	
					Amount	%
Public Administration	8,659.0	9,072.0	8,578.7	17,338.0	8,759.3	102.1
Tourism	11,557.8	15,128.3	24,040.5	35,870.6	11830.1	49.2
Construction	24,001.6	33,376.9	38,331.5	54,389.5	16,058.0	41.9
Transport	47,302.9	77,558.9	76,725.0	104,322.2	27,597.2	36.0
Agricultural Production	61,392	79,686.4	120,012.6	156,801.1	36,788.5	30.7
Mining & Manufacturing	135,068.9	177,934.9	257,843.0	279,108.7	21,265.7	8.2
Agricultural Marketing	0.0	0.0	0.0	0.0	0.0	0.0

Source: URT (2012)

From Table 2.7, it is noted that agriculture and mining indicate the least change in terms of credit facility services in 2011/12. However the two sectors are leading in terms of contribution to the GDP. Agricultural marketing was not allocated with credit in the same year while Public administration; tourism, construction and transport had an increased credit facility than agriculture and manufacturing. In such situation, agricultural production, processing (manufacturing) and marketing were not accorded significant priority in terms of financial services.

As regards to financial and trade policies, according to Isinika et al (2005), the re-introduction of trade liberalisation system has been appreciated. However, others point a finger on pricing policies, which prevailed before with a point that they had a lot of unintended effects. The overvaluation of exchange rates, for example, taxed exports and subsidised imports to the extent that it sometimes became cheaper for the importation of coffee than buying it locally thus having detrimental effects on local coffee production. In addition, up to 2004 Tanzania had no National Marketing Policy. Thus, under such circumstances, both private and public investments were not prepared to support farmers. As indicated in Figure 5.7 above, inadequate formulation, analysis and implementation of policies necessary for agricultural sector development led to lack of institutional arrangement coupled with volatile financial services for various

players along the agricultural supply chain. In total they attribute to inadequate know how, poor marketing infrastructure, lack of capital or access to finance and weak public and private investments.

ii. Inadequate Know- how

Although the thrust of the government has been put forth on the improvement of training, efforts to raise the level of student recruitment have not been adequate to cater for the need of existing population of farmers especially to match with the need of the entire Tanzanian population. A report by the Ministry of Agriculture and Food Security (2005) indicates clearly how the student and farmers enrolment for various training at agricultural research and training institutes has been inadequate. (Table 2.8): -

Table 2.8: Number of Students and Farmers Attended Training at MATs 2005-2011

No	Training Centre	Long-Term Courses		Short-Term Courses	
		2005-09	2010-12	2005-09	2010-12
1	Uyole	975	785	517	6,048
2	Igurusi	-	116	-	1,097
3	Ilonga	40	434	196	2,155
4	Ukiriguru	63	378	146	8,058
5	Mlingano	102	120	128	3,195
6	Mtwara	-	93	58	6,096
7	KATC-Moshi	-	-	781	3,682
8	NSI-Kidatu	-	339	123	1,556
9	Tumbi	-	68	NIL	250
	TOTAL	**2,333**	**1,182**	**1949**	**32,137**

Source: Ministry of Agriculture and Food Security, (2012)

As indicated in Table 2.8 the number of students and farmers trained throughout the country from 2005 to 2012 is too small compared to the farmers' population that is estimated at 90% of the country's population (45 million). The main problem indicated by the ministry is overdependence on donor financing to these training centres. For instance, from 2000/04 the government was depending solely to the National Agricultural and Livestock Extension Programme for training of extension officers. Such a programme is not sustainable as is purely donor funded.

iii. Poor Marketing Infrastructure

The study revealed that rural infrastructure in Tanzania, particularly in Kagera region, is poor and inadequate for development of coffee marketing systems. It cannot connect coffee production market areas

thus increasing marketing costs (URT, 2012). Most rural areas do not have access to power supply, communication services and other facilities such as storage, coffee processing, transport (roads, and water transport). They depend on budgets outside the agricultural sector. A total of 5,446.1 kms of roads were rehabilitated and completed in 2011 (URT, 2012) as presentedin Table 2.8:

Table 2.9: Conditions of Road Network in Tanzania by 2011 (kms)

Condition Type	**Trunk Roads**			**Regional Roads**			**Grand Total**
	Tarmac	Gravels	**Sub-Total**	Tarmac	Gravels	**Sub-Total**	
Good	2,720.1	2,926.0	**5,646.1**	250.5	8,867.9	**9,118.4**	**14,764.5**
Fair	1,213.3	2,390.2	**3,603.4**	65.5	6,371.4	**6,436.9**	**10,040.3**
Poor	227.0	897.1	**1,124.1**	11.1	3,353.4	**3,364.5**	**4,488.6**
Total	**3,913.7**	**6,020.6**	**9,934.3**	**327.5**	**18,629.9**	**18,957.4**	**28,891.7**

Source: Ministry of Infrastructure Development, (2012)

Observation from Table 2.9 is that the total tarmac roads were about 14.7percent of the total road network while the roads in good condition are 50percent. The trunk roads are less than 10,000 kms thus most of the road network falls under the category of regional roads. These are typical rural roads serving rural areas where the majority farmers undertake agricultural activities. It is from the fact that out of 18,957.4kms of regional roads, 18,629.9 that is 98.3percent, are gravels or earth roads. Such roads cannot facilitate reliable transportation of produce throughout the year. According to Gabagambi (2003), market infrastructure in Tanzania, especially road network has not been given due attention as a catalyst for stimulating agricultural productivity. Indeed, “Problems regarding crop marketing infrastructure affects agricultural production in two ways; firstly, the time and energy spent on transport. Secondly, increased marketing costs as a result of poorly maintained infrastructure (roads, power, stores, ICT, market places) are passed on to the farmers in terms of low farm-gate prices” (Gabagambi, 2003, p.?).

According to URT (2005), inter alia some of the constraints in agricultural marketing and infrastructure include inadequate information, limited access to telecommunication infrastructure. Table 2.10 indicates that the number of customers for landline and mobile phone is marginal compared to 45 million population of Tanzania.

Table 2.10: Distribution of Mobile Phones and Landline in Tanzania in 2011-12

Company	NO. of Customers by 2011	NO. of Customers by 2012	CHANGE %
TIGO	5,450,766	6,244,050	15
Vodacom (T) Ltd	11,625,773	8,967,269	-23
AIRTEL (T) Ltd	6,993,418	8,001,689	14
ZANTEL MOBILE	1,522,902	2,479,505	63
ZANTEL FIXED	1,699	8,953	427
SASATEL	5,824	4,810	-17
TTCL MOBILE	66,214	60,887	-8
TTCL FIXED	159,364	160,012	0.4
BENSON ONLINE	1,558	924	-41
Total	25,827,518	25,928,099	0.4

Source: Tanzania Communication Regulatory Authority (TACRA), (2013)

As indicated in Table 2.10, in 2012 there were seven companies providing voice telecommunication services as it was in 2011. Up to September 2012, only 11 % of the country's population had access to telephone services and mobile phone subscribers were 25,759,134 compared to 25,666,455 subscribers in 2011, equivalent to an increase of 0.4 percent. During the same period, landline telephone subscribers were 168,965 compared to 161,063 subscribers in 2011, equivalent to an increase of 4.9 percent. However, this is not a desirable situation to a big country with 26 regions and more than 45 million people. Marketing activities need a well-developed network of telecommunication services Gabagambi (2003).

iv. Inadequate Access to Capital

Gabagambi (2003) and URT (2005) contend that liberalisation of financial sector necessitated Co-operative and Rural Development Bank (CRDB) which was established for serving farmers to shift its priorities away from the smallholder sector after its privatisation and acquiring a formal credit is rare to peasants (Kashuliza, 2004, Mbiha et al, 1998). Currently in Tanzania, formal financial services are concentrated in urban than rural areas. Most of lenders consider agricultural business as risky (URT, 2005). Thus, interest rates charged by commercial banks on loans are relatively high ranging between 16.4 percent and 20 percent (URT, 2004). At the same time, although the land law has been reviewed, smallholder farmers are still unable to use their land as collateral to access finance since most of them do not have legal right of ownership (certificate of occupancy) to the land they cultivate. In order to address the problem of lack of access to finance, the URT (2005) indicates that the National Micro-finance Policy (2000) was formulated with the vision of achieving widespread access to micro-finance throughout the country. However, formal

financial services are not well extended to rural areas where the majority farmers live. Table 2.11 indicates different interest charged from 2007 to 2011: -

Table 2.11: Average Lending Discount and Interest Rates in Tanzania 2007-2011 in %

Years	Discount Rates (Central Bank)	Lending Rates to Short-term	Lending Rates to Medium& Long-term
2007	20.70	28.00	26.00
2008	16.60	21.40	21.30
2009	13.10	19.10	21.00
2010	9.78	20.94	19.24
2011	9.4	14.80	16.80
2012	10.60	16.40	13.50
Dec 2012	12.30	15.70	13.40

Source: Bank of Tanzania, 2012

As observed in Table 2.11, the discount rates charged on government and commercial banks borrowing from BoT are very high such that are not favourable for commercial banks to offer soft loans to farmers and other customers. The minimum average discount charged was 9.4 percent in 2010 while the minimum average interest rate charged to customers on medium and long-term loans in 2012 was 13.30% . This situation justifies the need for farmers' friendly financial policies that can enable them to have access to financial support in terms of credits.

v. Weak Public and Private Investments

Through market liberalisation policy, Tanzania has been privatising public enterprises. URT (2003) notes that by December 2003, a total of 289 enterprises were privatised and 328 non-core assets were sold. They have been privatised or sold to Tanzanians and foreign investors through sale of shares, asset sale, leasing and liquidationEssentially, most of them were established in 1967 after the Arusha declaration and were the vehicle for socialist policies and followed government and ruling party guidelines, but were not in conformity with international business and co-operativism principles (World Bank, 2000).

2.9.2 Effects of Inadequate SCM

The outcome of the aforementioned challenges is that the coffee supply chain has not been able to apply full SCM techniques and strategies. The World Bank (2000) mentions the effects of those challenges are:-

(i) Deterioration of Agricultural Services

The deterioration of coffee management is manifested through the poor execution of core agricultural functions including training to farmers and agricultural staff, input supply, introduction of new technologies, dissemination of improved seed, extension services, dissemination of early warning information, application of irrigation system, pest and disease control, provision of credit facilities as well as research and development. Inadequacy of these services has lead to declined coffee production, post harvest losses as well as export of low quality coffee that fetches low prices.

(ii) Application of Poor Technology

There is application of poor technology in almost all activities along the coffee supply chain (production, processing and marketing). This is the consequence of weak private and public investments, which also emanate from lack of capital due to volatile financial services. The type of technology currently applied in production, processing and marketing of coffee is not only poor but outdated. Thus it leads to the decline of coffee production, low quality coffee high transaction costs,post harvest losses, and low prices for coffee (refer to figure 6.2)..

(iii) Poor Marketing Services

The effect of poor marketing services is attributed to inadequacy of private and public investments, lack of capital, poor infrastructure and inadequate training. Weak marketing system leads to low producer price, high marketing transaction costs and smuggling of coffee through unofficial channels. Weak coffee marketing is also associated with farmers' tendency of shifting to growing other cash crops such as vanilla in Kagera and hence the decline of coffee production. The ultimate effect that is rampant in rural areas is the persistence of poverty among the people depending on coffee for household incomes.

2.10 Coffee Production, Processing and Marketing in Tanzania

Coffee was introduced in Tanzania early in the 20th Century as an estate crop, but eventually became a smallholder crop (Baffes, 2003). The area planted with coffee expanded significantly during the 1970s and 80s when its prices were favourable and attractive. Baffes (2003) notes that coffee production in Tanzania cannot is inseperable from co-operative movement in the country. Tanzania produces both types of coffee namely arabica and robusta mainly for commercial purposes. While 75 percent of the coffee produced is Arabica, robusta constitutes 25 percent of the total grown coffee in the country. Arabica is produced in

twelve regions including Kilimanjaro, Arusha, Tanga, Mbeya, Ruvuma (Mbinga), Iringa, Rukwa, Morogoro, Kagera, Mara (Tarime), Mwanza and Kigoma.

i. Robusta

ICO (2004) documents that the term 'robusta' widely grown variety of this specie. It is a robusta shrub or small tree grown up to 10 metres in height, but with shallow system. The fruits of robusta are rounded and take up to 11 months to mature while the seeds are oval in shape and smaller than those of coffea arabica. Robusta coffee is grown in West and Central Africa, throughout South-East Asia and, to some extent, in Brazil, where it is known as Conillon.

According to Kessy (1990) and TCB (1997), Robusta coffee was first introduced in Kagera (Bukoba) by the Banyoro raiders (conquerors) from Uganda. However, even in the early days, coffee had already been recognised as a stimulant during cold season. It was used mixed with fat into balls and consumed by warriors and travellers as iron rations and not as the ordinary beverage known by most people. Deliberate cultivation for commercial purposes started in the 1860's under the barter system as well as for chewing as a stimulant. Modern cultivation (plantations) for commercial motive under money economy started after the First World War 1914-18 and organised marketing was introduced in 1937 with the establishment of the Bukoba Co-operative Union (BCU). Therefore, Tanzania's robusta is similar to Uganda's coffee in almost all botanical aspects but is special for producing instant coffee.

Kessy (1990) suggests that the introduction of robusta coffee to Tanga and Morogoro were made in 1902 by the Germany colonial government in Tanganyika who established a botanic garden at Amani research centre. The organised marketing system of coffee started to operate in 1956 as a result of the establishment and growing of co-operative and independence movements in Tanganyika (currently Tanzania). Through this, coffee was collected by co-operative unions and auctioned at Mombasa in Kenya. However, due to competition with other cash crops, presently little robusta is produced in Tanga and Morogoro.

ii. Arabica

Coffea Arabica was at first discovered by Linnaeus in 1753. The average arabica plant is a large bush with dark-green oval leaves. It is generally different from other coffee species, having four sets of chromosomes instead of two. Its fruits are oval and mature in seven to nine months; always containing two flat seeds (the coffee beans). The same variety (Arabica coffee) was introduced in Tanzania as a commercial crop about

the year 1893 along the Mount Kilimanjaro at Kilema mission near Moshi. However, the first seed of arabica coffee was of the Bourbon variety by the Roman Catholic Mission at Morogoro from the French Island of Reunion (Bourbon) by the year 1880 (Kessy, 1990). From there, the seed was sent to the Roman Catholic Mission at Kilema as indicated above. TCB (1997) indicates that the coffee production for commercial motive spread all over the higher regions of Tanzania where it continues to be the main cash crop for many families. A number of more introductions of new varieties took place at different places and intervals such as Kent in 1920 from India as well as Nyasa from the Blue mountain region of Jamaica.

The coffee research station, Lyamungu, carried out successful selection from 1934 from the Bourbon and Kent varieties on the basis of good adaptability, vigour, high yield and acceptable quality. The recommended selections from Bourbon and Kent are still grown by the farmers in the coffee industry in Tanzania. However, robusta coffee growers so far still depend on coffee selection that was made at Kawand Research Station in Uganda (TCB, 1997). It was introduced in Tanzania as Nganda and Erecta although a local selection by the name is also grown. According to ICO (2004), Arabica coffee is grown throughout Latin America, Central and East Africa, India and Indonesia.

2.10.1 Importance of Coffee in the Tanzania's Economy

Coffee is the Tanzania's largest export crop that contributes about US Dollar 115 million to export earnings (one third of the total foreign exchange earnings), and provides employment to about 400,000 families of smallholder farmers (Mwakaje, 20089; Baffes, 2003, Kessy, 1990; Nchahanga, 2002; URT and World Bank, 2004; Komba, 2004). The records indicate that since 1975, coffee has been contributing between 25 and 41 percent of the national export trade. Thus, coffee is a major source of income for smallholder farmers in Tanzania. Apart from its importance in export earnings, by products of wet-processed coffee are used as compost for preparation of organic manure. Coffee farmers usually spread it in their coffee and banana fields as mulch in order to suppress weed growth. According to Kessy (2000), the factory curing by-product and the coffee hulls are also used as mulch and organic manure in the farms. It is further used as a source of power (fire) for running the coffee curing furnaces.

Coffee is among the main sources of income to the farmers in coffee growing regions in Tanzania. However, a trend in real income has been declining over time due to declining volume of production, low producer prices, inflation and increase in costs of production. In 1990, it was estimated that about 1.78 million (7.1 percent of the total population by then 24 million) people were directly employed in the coffee

industry. The importance of coffee in the Tanzania's economy can be traced among others, from its quality, measured by Tanzania's export price relative to the world price as indicated in Table 2.12 whereby the position of Tanzanian coffee in the world market is higher than other main agricultural export crops namely cotton, tea and cashew nuts.

Table 2.12: Value of Tanzanian Exports of Selected Crops (USD '000)

YEAR	COFFEE	COTTON	TEA	CASHEWNUTS
	Exports Values in USD '000			
1990-1993	79,175	78,483	21,850	14,716
1994-1997	123,745	107,250	30,855	59,058
1998-2002	93,068	51,071	35,990	76,065
	World Share in %			
1990-1993	1.28	1.08	1.07	16.39
1994-1997	1.08	1.24	1.20	35.92
1998-2002	1.11	0.54	1.25	33.06
	Sub-Saharan Africa Share in %			
1990-1993	7.65	8.30	6.06	35.59
1994-1997	7.28	9.87	6.20	53.13
1998-2002	8.85	3.41	6.68	42.14

Source: URT and World Bank, 2004

Table 2.12 indicates that although cashew nut seems to have large command in the world market as well as in the Sub-Saharan Africa share, coffee has been leading the crop for Tanzania to earn USD 79.175 million and USD 123.745 million in the years 1990-1993 and 1994-1997, respectively. Any crops among cotton, tea and cashew nuts could not reach the value of foreign exchange earnings accrued through the export of coffee in these two periods. In order to explain the importance of coffee in the Tanzanian economy, Table 2.13 is presented except that in the year 2003 where coffee fetched USD 15.2 million as compared to Tobacco fetched USD 47.3 million, the rest of the period 2003 to 2009 coffee was the leading cash crop that was fetching the highest amount of foreign exchange earnings.

Table 2.13: Value of Tanzania Exports of Major Cash Crops 2003-09 (Tshs billion)

CROP	2003	2005	2006	2007	2008	2009
coffee	15.2	83.6	92.8	143.3	124..1	150.0
Cotton	42.4	77.2	56.8	49.8	95.6	115.2
Sisal	6.9	8.2	9.3	7.4	18.5	-
Cashew nuts	43.4	54.2	62.7	33.8	82.0	-
Cloves	10.5	9.6	10.0	10.6	16.0	18.5
Tobacco	47.3	81.4	89.2	116.9	110.2	116.9
Tea	25.7	28.8	41.7	48.3	50.3	88.1

Source: National Bureau of Statistics (2009) Exchange rate: 1 US Dollar=Tshs 1,320.03

Almost all of produced Tanzania's clean coffee (99percent) is exported, and is marketed through the Moshi international auction conducted every week. According to URT and the World Bank (2004), due to recent reforms of the trade liberalisation some of the coffee is smuggled through un-official channels. This state of affairs affects the available statistics about coffee sales. Another factor for generating un-reliable data according to Komba (2004) is that due to its superiority quality, Tanzanian coffee receives a small premium over the average world prices.

Baffes (2003) observes that before 1990 the TCMB together with co-operative unions were responsible for handling all coffee marketing (including input provision, transportation and processing). However, new reforms introduced in 1990 affected among others input supply, price announcements, and dollar export earnings. More comprehensive reforms were introduced in 1994/95 allowing private traders (coffee buyers) to purchase coffee directly from farmers, process it in their own plants and handle it over to TCB for export through the auction at Moshi. There is a big doubt that not all purchased coffee is presented for auction at Moshi.

2.10.2 Coffee Production Trend in Tanzania

Nchahanga (2002), Mwakaje (2008) URT and the World Bank (2004), comment that Tanzania is among the well known African coffee producers and exporters. According to them, there are more than 400,000 coffee producers in this country. The crop production involves both smallholder and large-scale farmers. They observe that farming survey carried out during 1994/95 seasons large scale commercial and institutional indicated that coffee is grown on 154 commercial and institutional agricultural holdings/estates. According to this survey, these holdings were concentrated in the regions of Kilimanjaro (33 percent), Arusha (38 percent), and Mbeya (10 percent). The total planted area of coffee was 250,000 hectares whereby the privately registered companies operated the largest area of about 73 percent. The number of planted coffee tree was 5,695,457 that were distributed in sense that government operators four percent, parastatal organisations one percent, 84 percent by private registered companies, six percent by private non-registered companies and other operators about eight percent.

Currently, Tanzania is producing an average total of about 51,000 tonnes of clean coffee annually (TCB, 2014). There are three main coffee producing areas namely the North (Kilimanjaro and Arusha), the South (Mbeya, Ruvuma, Rukwa and Iringa) producing mild arabica coffee. Another block is the Lake Zone mainly

for robusta coffee and small quantities of Arabica comprising regions of Kagera, Mwanza and Mara (Tarime). Small quantities are also produced in Tanga, Morogoro and Kigoma (Kessy, 2000). The coffee producing area has almost doubled from the liberalisation of coffee market. Smallholder growers have increased the growing from 115,000 hectares in 1973 to 258,000 hectares in 2002. The author makes a note that smallholder farmers command the majority of the area with 246,000 hectares while area under estate cultivation on the other hand has remained constant of about 12,000 hectares. Various literatures on coffee production in Tanzania including URT and the World Bank (2004) suggest that its production moderately declined from the early 1990s to 1998 after which it gradually increased until 2003. Coffee production is as summarised on Table 2.14:

Table 2.14: Tanzania Coffee Production Trend (in Metric tons) 2000/01-2007/08

TYPES OF COFFEE	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
ARABICA	40,981	41,500	42,060	22,566	24,758	27,878	35,762	27,918
ROBUSTA	17,007	12,000	34,368	16,138	9,133	21,028	19,076	15,606
TOTAL	57,988	53,500	76,428	38,704	33,891	34,334	54,838	43,524

Sources: Nchahanga (2002), FAO & MAFSC (2008) and URT, (2009)

Table 2.14 above underlines the fact that coffee production in Tanzania has been decreasing. Over eight years period, the average production has been approximately 45,000 metric tonnes while long-term average had been 50,000 metric tonnes (URT, 2002b and URT, 2002c). This gives the indication that coffee production is operating much below its potential. The information contained in URT and World Bank (2004), indicate that the current area under coffee production in Tanzania is estimated to be 250,000 hectares compared to the suitable area for coffee production which is about 650,000 hectares. According to Nchahanga (2002), the present acreage under coffee production (around 250,000 hectares); estimated average of coffee production should have exceeded 80,000 metric tonnes by the year 2002.

2.10.3 Coffee Production System

There are two major types of coffee farming systems practiced in Tanzania, namely smallholding cultivation and estate (plantation) farming. According to the Ministry of Agriculture and Food Security (1999), in both farming systems, yields have declined steadily over the past two decades. Over this period, smallholder mild arabica yields have declined from around 370 to 190 kilogram per hectare. For the private estates, farm yields have declined from an average of 900 kilogram per hectare to about 200 kilogram per hectare.

i. SmallholderFarming System

This is a system purely practiced by majority of rural farmers popularly known as 'peasants' who own small plots of about 0.5 hectare. Under this system, mild arabica coffee is either inter-cropped or grown as pure-stand cultivation, while for robusta and hard-arabica, only the inter-cropping system is adopted by farmers (MAFS, 1999). Technically, the recommended planting density for the pure-stand system is 2000 plants per hectare and 1,350 plants per hectare. According to Kessy (1999) and MAFS (1999) in the Southern Zone particularly for the newly planted coffee pure-stand cultivation is more common and plant density varies from 1000 to 2000 plants per hectare. In the traditional coffee growing zones inter-cropping is applied. The best type of shade trees in the regions were inter-cropping is used are 'Albizzia' and 'Grevillea'. Shade trees have proved beneficial, by suppressing weeds, particularly 'rhizomatous' grasses, reducing nitrogen requirements, reducing excessive temperature variations and regularising cropping. In some parts of the country such as Kagera, Kilimanjaro and Arusha.Bananas are planted between coffee to provide shade as well as valuable source of food.

ii. Estate/Plantation Farming System

In Tanzania, all estate coffee farms or plantations are pure-stand, except for some limited inter-cropping of food crops such as beans. A number of estates are highly shaded with trees. Before nationalisation of private enterprises including estates during the Arusha Declaration 1967, there were 172 estates in the country and out of these, only 62 were nationalised.

As noted above, the Tanzanian government participation in the agricultural sector can be traced back to the colonial period. During the early years of independence, most of the coffee estates were privately owned. Agricultural co-operative unions were agents of the government by this time and were replaced by crop authorities to operate state owned plantations. In order to take care of nationalised large-scale estates during Arusha declaration, the National Agricultural Company (NACO) and National Agricultural and Food Corporation (NAFCO) were established. According to Kapunda (1998), in 1997 the state owned coffee farms covered 90,000 hectares. However, due to bureaucracy and inefficiency in these agricultural co-operative unions and agricultural parastatals, some these farms collapsed.

2.10.4 Coffee Production Constraints

Coffee production constraints arise from poor quality of seed and planting materials including poor crop husbandry practices, ageing of coffee trees, inadequate research and extension services, frequent attack of

pests and diseases (leaf rust, coffee berry and fusarium back diseases). Reliance on rain-fed cultivation, poor motivation to farmers, high production costs, excessive involvement of state and politics and inefficiency of the input supply system also are bottlenecks facing coffee growers. In total, these constraints, have seriously affected coffee production and productivity as well as quality. Thus, production capacity of about two-thirds of smallholder farmers has been reduced.

2.10.5 Coffee Processing in Tanzania

Coffee goes through a number of stages in moving from farm level to domestic and international markets (URT and World Bank, 2004). Primary processing takes place at farm level including harvesting, drying and grading except in the case of mild arabica coffees, which require fermentation, pulping and drying. Farmers usually sell primary processed coffee except arabica coffee in the southern zone. Farmers always process coffee at their facilities for conversion it into internationally traded quality. Currently, only two percent of the coffee is processed to final product for local consumption.

The stages differ between mild arabica and robusta and also between smallholder and estate coffee. ICO (2004), Kessy (2000) and TCB (1997) observe that there are three basic stages of coffee processing namely cleaning, drying and hulling. Theynote that there are variations on how the process may be carried out, depending on the size of the plantation, the facilities available (either capital or labour intensive) and the final quality of coffee desired. There are two major types of drying before the coffee is roasted these are dry for Hard Arabica and Robusta and wet methods for Mild Arabica.

i. Dry Method for Hard Arabica and Robusta Coffee

Both Robustas and hard Arabicas are red, as is the case for mild arabica. The harvested cherries are then spread out on the sun by using drying mats, trays, and large concrete or brick patios and sometimes on earthen patios. Drying can take up to approximately 10 consecutive days under normal weather conditions. On large plantations, machine drying is sometimes used to speed up the process after the coffee has been pre-dried in the sun for few days. The drying process is very important since it affects the final quality of green coffee. Coffee that has not been dried sufficiently always is too moist and prone to rapid deterioration caused by the attack of fungi and bacteria. Dried cherries are sorted in special silos until they are packed in bags and sent to the curing factory (dry mill) where hulling, sorting, grading and bagging take place. In Tanzania the sun dried cherry locally known as ‘maganda’ are stored until when they are collected by either

co-operative unions or private traders responsible for delivering them to curing plants. Sometimes there are delays in collection because of communication failures and transport shortages.

ii. Wet Method for Mild Arabica Coffee

According to ICO (2004),the wet method is used for mild arabica coffee only and requires the use of specific equipment and substantial quantities of water. When properly done, it ensures that the intrinsic qualities of the coffee beans are better preserved, producing a green coffee, this is homogeneous and has few defective beans. Hence the coffee produced by this method is of better quality and commands higher prices than others. Processing of mild arabica starts when ripe beans called red berries are picked (harvested). The operation of preliminary sorting and cleaning of the cherries is done as soon as possible after harvesting in order to ovoid any deterioration of the fruit which might affect the quality of the beans. This process is done by using washing tanks filled with flowing water. They are taken for pulping (removing coffee beans from cherries) on the same day.

TCB (1997) opines that pulping is done by the machine and clean water, which squeezes the cherries between fixed and moving surfaces. The wet beans are preserved in the special fermentation tanks for 48 hours after which they are washed to remove mucilage. After a further 12 hours soaking in the clean water, the beans are washed in fresh water, and then transferred to the raised drying tables made of tray wires or a mechanical dryer. Drying begins immediately after washing to avoid re-fermentation.

From the raised coffee tray tables where initial drying is done, the beans are transferred to another set of tray wire tables covered with Hessian cloth. Drying is carried out in such a way so as to avoid bean damage by direct sunrays and to attain the standard moisture content. Drying takes approximately 10 days under good weather conditions. The hot-air drying machines are applied to speed up the process in large plantations where there might be more coffee. After drying, the wet-processed coffee called parchment coffee is stored and are packed in well aerated bags and transported to the curing factories

The final stage of preparation of hard and mild arabica and robusta is known as ‘curing’ (ICO, 2004, TCB, 1997). It entails the removal of the husk from the beans, then the polishing of the beans, followed by grading. Usually it takes place at a special plant just before the coffee is sold at the auction for export. The coffee is hulled to remove the parchment, passes through a number of cleaning, screening, sorting and grading operations, which are common to both, wet- and dry-processed coffee. Grading involves the separation of the beans according to shape, size and density. According to Ministry of Agriculture and Food

Security (1999) and TCB (1997), there are ten grades based on the size and shape of the coffee beans. The processing factories may have electronic sorting machines for the removal of 'off colour' and defective beans, including those known as 'stinkers', which cannot be distinguished by bare eyes. From there, samples of each grade are taken to the coffee board for liquoring. Cured coffee is bagged into international standard 60kg sisal bags and stored in the stacking area ready for export.

2.10.6 Coffee Processing Constraints

Most of coffee processing constraints are related to local technological inefficiency, lack of modern machinery, and inefficient local infrastructure such as power supply, repair and maintenance facilities. Assessment indicates that currently coffee-processing capacity in Tanzania is about 30 %. Other constraints include nationalisation of coffee estates brought in people with little knowledge about coffee processing and lack of countrywide campaign for improving quality of coffee.

2.10.7 Coffee Marketing in Tanzania

The coffee from Tanzania is sold through auctions organised by TCB at Kahawa House in Moshi Municipality held fortnightly Ministry of Agriculture and Food Security (1999). Marketing of coffee in Tanzania begins at farm level where farmers sell their coffee either directly to private companies or to co-operative unions around their places through primary societies (TCB, 1997). The coffee is then delivered to the various processing factories where it is hulled and graded into various green coffee beans. Samples of these grades from all processing factories are drawn and sent to the TCB liquoring unit. Liquoring is done by tasting and classifying of coffee from each lot to determine its quality. Based on quality assessment, liquoring unit sends instructions back to factories to bulk outturns, which are of similar grade and quality. After bulking, the factories prepare warehouse warrants, which together with bulk samples are forwarded to the liquoring unit of TCB for the preparation of an auction catalogue.

On the basis of the catalogue, TCB distributes samples of lots to exporters (who come for buying coffee in Tanzania) two weeks in advance before the auction day. However, one day before the auction, the liquoring unit of TCB conducts one more testes and classification of coffee ready for sale to justify the quality and values of it to establish a reserve price. Exporters come to the auction after receiving liquored coffee samples from TCB. After the auction, exporters select from their purchases lots, which match with their customers' quality before the coffee is transported to the ports of either Tanga or Dar es salaam for shipment.

i. Coffee Marketing System Development

The first marketing co-operative of native cultivators was established in the Kilimanjaro area in 1932, primarily to promote coffee as a cash crop among peasant farmers. Co-operatives grew in size and number, but they were confined to regions producing export crops only (Baffes, 2003). After independence in 1961, government expanded co-operatives into other areas that had no co-operative experience. Ministry of Agriculture and Food Security (1999) indicates that before 1976, the primary societies handled buying of coffee, paid farmers, and delivered it to the two main co-operative union-owned processing factories, in Moshi (for arabica) and in Bukoba (for robusta). The coffee was sold at the Moshi auction, operated by theTCB. The government dissolved all co-operative unions and abolished the primary societies in 1976. Coffee Authority of Tanzania took over for eight years, performed no better and in 1984 the co-operative unions and primary societies were reinstated. They became responsible for coffee procurement, transportation, and processing functions.

After milling and grading, the coffee was delivered to TCMB for purchase at auction by private exporters. TCMB kept a legal monopoly in selling coffee and providing inputs for production as well as regulatory functions. The whole marketing system faced a multi-payment network that reduced uncertainty for the growers, introduced considerable price risk for the co-operative unions. Thus, poor performance of unions along with the inflexibility of the pricing system and low world prices necessitated a review of the whole marketing system so as to eliminate some layers in the marketing chain.

ii. Trade Liberalisation of Coffee Industry

The first steps in liberalisation of the coffee sector were taken in 1990 when the TCMB delegated the responsibility of crop buying to co-operative unions (URT and World Bank, 2004, Baffes, 2003). In 1992, under the International Development Association (IDA) credit operation, more reforms took place and the Board became marketing agent rather than a marketer, charging a fee of 1.6 percent of the auction sale. During the 1993/94, the government of Tanzania totally eliminated the monopoly held by the board and unions for coffee and allowed the private sector to compete with them. Liberalisation exposed coffee industry to market forces and made unions more independent.

URT and the World Bank (2004) indicate that new marketing developed with the reforms. The elimination of the monopoly of the crop board for marketing and trade in the mid 1990s came with fundamental

changes of institutional arrangement of the coffee. The share of private sector in trading of coffee increased. Before 1994, about 75 percent of coffee was marketed by co-operative unions, 19 percent by other government organisations, and six percent by private companies. However, four seasons later, the market shares were 26, 7, 1 and 67 percent by co-operative unions, estates, government institutions and private companies respectively. Generally, private sector investment in producing, processing, and marketing constituted a further institutional development in coffee industry. Coffee curing factories increased from two union-owned (each one for arabica and robusta) to over 12 new factories since 1993.

After several years of trade liberalisation in coffee industry, government instituted additional interventions. New regulations were introduced in 2000/01 for coffee through the Coffee Industry Act No.6 of 2001. Under this Act, TCB has powers to inspect, monitor, register, regulate or license crop varieties, production, marketing, grading, standards, trading, processing, storing, selling and exporting of coffee. While unions, primary societies and farmer groups are exempted from license regulation, private traders have to obtain a wide range of licenses. For growers, barriers to entry result in limited marketing channels, and potentially lower prices due to narrow chance of private sector competition.

Under the same Act, the TCB has given power to introduce “one license rule” to discourage collusion and or vertical integration that would negatively affect competition. Some stakeholders in the coffee industry have the opinion that this move is limiting more traders to engage in both buying of primary processed coffee and exporting green coffee. They regard “one license rule” as a denial of permit to private coffee buyers linked to previously vertically integrated exporters. They further assert that the system is reducing competition for primary processed coffee and limiting financing of input supply as well as other investments that would have contributed to improvements of the quality of Tanzanian coffee.

2.10.8 Coffee Marketing Constraints

Marketing problems listed by World Bank (2004) and Baffes (2004) are attributed to poor motivation of farmers in the form of low producer prices, buying on credit, prolonged or delayed payments to farmers have been widespread phenomenon as well as inadequate competition among coffee buyers (individuals, companies and co-operative unions). Declining of standards of grading coffee at buying posts, too high taxation rates and complicated tax code imposed on coffee are also part of marketing constraints. Indeed, these constraints coupled with poor pricing policies (low prices) dramatically discouraged coffee farmers in Tanzania.

2.10.9 General Challenges of Coffee Industry in Tanzania

Although many reforms took place in the coffee industry in Tanzania during the 1990s, these reform processes have not been completely successful. Challenges in the coffee industry did not only have negative impact or decline of quantity but also on its quality. According to IFAD (2002a), URT and the World Bank, (2004), Nchahanga (2002), and Ministry of Agriculture and Food Security (1999), the major challenges are on financial services mainly facing almost all stakeholders because they cannot have access to regular financial services providers in order to access input or monetary credit facilities. However, due to lack of collaterals and absence of commercial banks in rural areas, most of farmers and buyers of coffee are facing financial difficulties in order to engage full in coffee production, processing and marketing. Others are lack of price and market information as well as inadequate marketing experience and skills

2.11 Coffee Supply Chain in Kagera Region

2.11.1 An Overview of Kagera Region

Kagera region is located in the extreme northwest corner of Tanzania. URT (2004a) indicates that the region lies just below the equator between $1^0$00' and $2^0$45' south latitudes. Longitudinally the region lies between $30^0$25' and $32^0$40' East of Greenwich. This includes large part of the waters of Lake Victoria. The landmass lies between $30^0$25' and $31^0$48' Longitudes East. The region has common border with Uganda to the North, Rwanda and Burundi to West, Shinyanga and Kigoma regions to the South. The whole part of its eastern border is made up of Lake Victoria.

Kagera region covers a total area of 40,838 sq.km. Out of the total area, 28,933 sq.km. is land and 11,885 sq.km is covered by water bodies of Lake Victoria, Ikimba and Burigi Lakes Kagera and Ngono rivers. According to FAO and MAFSC (2008) survey, the region has more than 440,393 hectares of land under cultivation; this means that about 15.5 percent of the land is for farming while the greatest part has not yet put the plough. The region is divided into eight administrative districts namely Biharamulo, Bukoba Rural and Bukoba Urban, Karagwe, Muleba, Misenyi and Ngara and newly established Kyerwa district. Bukoba Township is the regional administrative and major business town centre.

2.11.2 Climate and Soils

URT (2004a) presents that Kagera region experiences a bi-modal rainfall pattern, from March to May and from October to November, with average annual rainfall between 500 and 2000 Millimetres. Rainfall is higher along the shores of Lake Victoria and decreases inland away from the Lake and also with altitude,

varying from 2000 mms a year near Bukoba to 500 mms in the west. Temperatures range between 20^{0}C and 28^{0}C. The region consists of a series of hilly running North-South and parallel to the lakeshore. The banana growing areas are mostly on the tops of hill ridges. These soils have high iron and clay contents. However, the soils are low in phosphorus and acidity. The nitrogen content of these soils usually low, but to some extent is artificially maintained by intercropping with legumes and to a less extent by manure. Due to high rainfall regimes in areas along and near the lakeshore coupled with bad soil management, soil erosion is a serious problem.

2.11.3 Population and Employment

Kagera region is one of the moderately populated regions in the country. According to the National Bureau of Statistics (2009), during the 2009 Population Census the region had a total population of about 2.470 million with an average annual growth rate of 3.1 percent, population density of 85 people per square kilometre and a total household size of 5.2. This regional population represents 6.07 percent of the total Tanzania Mainland population of 40 million. Population migration is among the factors that are most affecting both population growth and density in this region. The migration is due to search for fertile farmland, pastures, water for livestock as well as employment opportunities in neighbouring town centres and abroad. The region massively receives refugees due to civil wars in the neighbouring countries of Rwanda, Burundi and Congo DRC. Meanwhile agricultural activities have not been able to satisfy the economy in the region. Due to its low productivity for both cash and food crops, the rural population particularly young generation has been forced to seek for other alternatives outside the region. The 2009 population census of the region's adult population indicates that the big proportion of the population is engaged in the agricultural sector which constitutes 88.2 percent of the employed population. In 1988, 90.9 percent of all workers were engaged in agriculture or agriculture related employment.

2.11.4 The Economy

From the URT (2009) and MoFEA (2014), we learn that the main economic activity carried out by the biggest proportion of Kagera region's population is agricultural production, which is the mainstay of the people of Kagera. It engages about 90 percent of the regional population in the production of food and cash crops. Important food crops are bananas, cassava, maize, sweet potatoes, sorghum and beans. coffee, cotton and tea are the main cash crops grown although at subsistence level. The Kagera Sugar Company carries out sugar cane growing for commercial purposes. From the foregoing explanation thus, agriculture contributes most of the region's income mainly from coffee, sugar cotton and tea. According to

the available records, agricultural sector contributes 50 percent to the region's GDP. In terms of Per Capita GDP at current prices, the region recorded Tshs. 550,105 (US$ 366.74) in 2013 and average contribution to the National GDP 5 percent.

Fishing had contributed very little to the region's economy in the past. URT (2004a) and MoFEA (2009), explain that with the introduction of fish fillet semi-processing plant in Bukoba, fishing has become an important sector in cash earning as well as employment. Kagera has favourable environmental conditions that permit the raising and keeping of traditional and exotic cattle. However, livestock sector is very insignificant in terms of economic contribution to the region's economy except that the introduction of dairy farming is still at household. The contribution of fishing and livestock sub-sectors remained low. But given some concerted efforts, these two sub-sectors could absorb a large work force and so contribute more towards employment in the region. Other productive sectors in the region include mining (nickel also tin and iron ores in Ngara and Karagwe districts respectively) and natural forestry.

2.11.5 Economic Infrastructure

The location of Kagera region is the remotest part of the country from the industrial and administrative centre URT (2004a). It is cut off to the east by Lake Victoria and therefore the region's access overland to the rest of Tanzania is restricted to the region's southern border. The region has neither reliable all weather road links nor Marine transport as the main means opens to the region handling cargo and passengers as the lake transport link is under developed. Air transport, the only alternative for urgent cargo or passenger is expensive for ordinary people. The region's isolation is enhanced by the lack of a railway link. Therefore, the development of reliable transport links between the region and the rest of Tanzania is of paramount importance.

Kagera region has a total of 3,951 kms of roads concentrated along the lakeshore and the southern border MoFEA (2009). Road development is least along the borders with Uganda and Rwanda. These 3951 kms are subdivided into 605.5 kms trunk roads, 1,135.0 kms regional roads, 1,176.9 kms district roads and 1,033.6 kms feeder roads. With unreliable land routes to and from Kagera region, marine transport is the main means open to the region of handling cargo and passengers. Air transport is the only alternative serving minority of the people. The regional airstrip is capable of handling light aircrafts only. The region depends on its telecommunication links on Tanzania Telecommunications Company Ltd (TTCL) and mobile companies. Postal services are available in the region with at least one fully-fledged post office in each

district. According to the 2002 regional economic survey, only 3.0 percent of the region's population had access to electricity mainly currently supplied from Uganda. The industrial base of Kagera region is still very small such that the mix of industrial established varies from small to medium sizes. Small-scale industries include sawmills, carpentry workshops, motor vehicle repair garages, printing, flour milling and black smith. Medium-size factories include coffee hulling factories, sugar and soft drinks manufacturing, cotton ginnering, tea blenders and instant coffee manufacturing.

2.11.6 Coffee Production

According to the FAO and MAFSC (2008), the region produces the two varieties of coffee namely Arabica and Robusta. Based on records of coffee purchases by type, 86 percent of the total sales are Robusta while the rest is Arabica. Basically, the crop is grown by smallholder farmers (about 95 %) while estate production in Kagera ranges from five to seven percent. The coffee growing districts are Karagwe, Muleba, Bukoba Rural and Bukoba Urban. Ngara and Biharamulo districts produce small quantities while Chato does not produce coffee at all. Table 2.15 presents coffee production in Kagera region.

Table 2.15: Coffee Production by Districts in Kagera Region 2006/07-2009/10 (Metric Tones)

DISTRICTS	2006/07		2007/08		2008/09		2009/10	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Karagwe	9,124	7,888	13,234	8,794	17,205	21,384	22,470	7,805
Muleba	2,138	1,848	5,529	4,862	7,188	4,835	10,400	1,680
Bukoba	5,187	4,484	8,181	4,097	10,634	2,561	13,000	1,569
Ngara	350	303	462	339	601	1,270	750	470
Biharamulo	28	24	25	21	27	21	40	32
Misenyi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL	16,827	14,547	27,431	18,113	35,655	30,071	46,660	11,556

Source: Kagera Regional Agricultural Office, 2011 and MAFSC, 2011 N/A = Not available

In terms of production, Karagwe district is the leading by large margin while Biharamulo is the least coffee producer in the region. The data for Missenyi is combined with Bukoba as this is a newly established district. The data for the year 2009/10 show declined in production but the reason is that it includes statistics collected up to September 2010 only.

2.11.7 Coffee Processing

Up to the 1990s, the only coffee processing plant in Kagera was Bukoba coffee Curing Plant Limited (BUKOP) based in Bukoba Township. The Coffee Board previously owned the plant but now the ownership

has been transferred to KCU Ltd. It processes all Robusta and hard Arabica coffee from Kagera and Kigoma regions. The factory has installed capacity of 22,000 metric tonnes of parchment equivalent to 17,600 metric tonnes of clean coffee beans. However, currently there are five coffee curing factories in Kagera namely BUKOP Ltd, Tanganyika Instant coffee Company Limited (TANICA) in Bukoba Urban district, Azania Fresh Food Co. Ltd, and IKA Investment Co. Ltd in Bukoba Rural District also Azania Fresh Food Co Ltd in Karagwe District.

After picking, Hard Robusta and Arabica coffee are sun dried on drying mats, trays and sometimes-earthen patios. The resulting product is sun-dried cherry or "maganda" in Bukoba vernacular language, which is subsequently dry-processed to become unwashed hard Robusta and Arabica. It is sold as dry cherry to either private traders or co-operative unions. The buyers store coffee by until it is sent to curing factories. Sometimes there are delays in collection and delivering to the processing plants due to communication failures and transport problems. After being received at the factory in parchment form, coffee is weighed and stored separately in lots belonging to each coffee trader, estate or Primary Co-operative Society (PCS). Parchment coffee is hulled, graded physically and sorted. Samples of the grades are submitted to TCB for liquoring and the coffee is classified into one of the seventeen classes. Cured coffee is bagged in 60kg bags according to the standards set by ICO. The bagged coffee is stored in the stocking area along the shore of Lake Victoria. At present, sorting at BUKOP is not conducted due to using of old machines (it was installed in late 1930s) as a result, the under grade beans cannot be extracted, thus coffee processed by BUKOP is sold ungraded. The coffee is auctioned at Moshi on the basis of samples and transported to Tanga Port.

2.11.8 Coffee Marketing

There are three marketing channels conducting marketing of coffee in Kagera region prior to auction at Moshi (Mwakaje (2008). These channels include primary societies of co-operative unions, Tanzania Coffee Growers Association and private dealers. However, farmers in Kagera region sell all their coffee as unhulled hard coffee (dry cherry) either to existing co-operative unions of KDCU, KCU and BCU or to private buying companies and individual traders. Before the liberalised economy, all the produced coffee had to be marketed through the marketing channel controlled by the co-operative unions only. The unions had the responsibility of making advance payments to farmers and paying the curing charges, transportation and other incidental expenses that are necessary to enable the coffee reach buyers in the

marketable form. The idea behind this export arrangement was to ensure that all the surplus income accrued out of the sales is passed back to the farmers as second payments.

Mwakaje (2008) clarifies that the main functions of the primary societies and private buyers are to collect coffee from farmers, store it, and carry out primary grading, operation of medium-scale nurseries and farms as well as central pulpier. They sometimes also supply farm inputs and implements to the farmers. Finally they deliver the purchased coffee to respective co-operative unions. Functions of the co-operative unions include transportation of coffee stored from primary societies and deliver it to processing factories. They usually secure bank credit facilities for purchasing of coffee and necessary farm inputs.

2.11.9 Challenges of Coffee industry

Constraints facing coffee production, processing and marketing in Kagera region among others as listed by Kessy (2000) include the following: -

i. Poor crop husbandry- the soils in the region are poor in nutrients, few farmers apply fertilisers or manure. The use of pesticides is very minimal while pruning and suckering of coffee trees are not adequately done due to lack of pruning tools, high costs of inputs as well as lack of coffee extension services and training to both farmers and agricultural personnel.
ii. Insulated market system-The coffee marketing procedure has been too long insulated from competition and financial responsibility thus, making it inefficient.
iii. Lack of producer price incentive- over the years, real producer prices has been very decimal with a very slight increase. There has been no realistic price differentials based on coffee quality
iv. Declining of quality of coffee and lack of quality incentives- there is a serious deterioration of quality of coffee from Kagera associated to lower producer prices and lack of grading differentials at the buying centres coupled with the use of old machines for curing (specifically at BUKOP).

The Coffee SCM presented by many scholars including Mwakaje (2008), Baffes (2003), Kessy (1990), Nchahanga (2002), URT & World Bank (2004), and Komba (2004) appreciates that this is the Tanzania's largest export crop that contributes substantially to export earnings for the country, and provides employment and income to smallholder farmers. However, the literature reveals that there is a serious deterioration of quality and quantity of coffee produced in Kagera due to lower producer prices and lack of grading differentials at the buying centres tied to the use of old technology (machines) for curing and grading.

marketing of coffee begins at farm level where farmers sell their coffee either directly to private companies or to co-operative unions around their places through primary societies (TCB, 1997). The coffee SCM especially in Tanzania facing a long list of coffee mmarketing constraints for instance the cooperative unions had the responsibility of making advance payments to farmers and paying the curing charges, transportation and other incidental expenses that are necessary to enable the coffee reach buyers in the marketable form. When the export arrangements are completed, all the surplus income accrued out of the sales is passed back to the farmers as second payments. This means that there is no proper marketing arrangement and information prior to buying of coffee from farmers. The section also presented another major challenge of coffee supply chain as inadequate financial services that perpetuate buying on credit and prolonged or delayed payments to farmers.

2.12 Conclusions

This chapter has reviewed the concept of SCM in order to enable more understanding about its definition, theories and background. The study presented various practical examples of application of SCM in agriculture especially production, agro-processing and marketing of agri-products with reference to different countries from Africa, other developing countries and the world at large. This research work explored large practical experience in application of SCM in coffee production, processing and marketing. Since this is a case study focusing on agricultural sector in Tanzania, the researcher reviewed this sector in terms of its background, the current performance, its contribution to the economy as well as the challenges it is facing. Regarding coffee production, processing and marketing, this study has reviewed literature in many developing countries producing coffee and narrowed down to Tanzania, Kagera region in particular.

Having reviewed theoretical and empirical evidences, the most important aspects that explain the existence of the SCM include the following:

- Networks of individual firms with common or different specialization;
- Partnership of individual firms in provision of service to the customer or commodity;
- Ownership of activities and firms;
- Coordination of activities along the chain; and
- Governance of the process, specifications, performance, standards/quality and logistics

The study has proved that the benefits of successful application of SCM in agricultural activities include:

- reduced cost through specialisation;

- improved synergistic performance (performance based on cooperation or integration);
- increased information to support joint planning;
- enhanced customer services;
- reduced risks and uncertainty;
- shared creativity, brevity, skills and enhance competitive advantage; and
- quality products and standards with adherence to specifications due to governance.

The literature gathered gives an overview about theory and practice of SCM knowledge. It indicates that SCM is so rich that it can accommodate and be applied in business, law, economics, logististics as well as social aspects. The theoretical part indicates the success while a number of challenges have been encountered by the application of SCM in various disciplines. The practical side has tried to document the areas where there has been application of this model in various countries across the world, developing countries and in Tanzania. The main message and in fact a gap that has been identified on the coffee SCM in Tanzania especially in Kagera region is that coffee makes contribution to the country's economy. However, the crop is facing serious constraints along its supply chain. There is no appropriate coordination of links so as to deliver superior customer service, safe and quality products. No collaboration between farmers and buyers of coffee in production and processing. In such a situation, the buyers of coffee cannot be sure of the safety and quality of the coffee. There is no feed back to farmers as regards to the quality of coffee produced. This situation poses a challenge and has created a gap that need further research in order to revive production, productivity and economic status of coffee in Tanzania and Kagera's economy. The reasons and solutions for this challenge are expected to be explored in this study.

The identified literature gap is the base for assessing and proposing the appropriate CSCM for Kagera Region. The theory of SCM prescribes that there must be a coordination of individual links and all links. However, its practice has left a number of questions. A vivid example is the existence of ICO for coordination of marketing of coffee internationally, while there is no any international body for coordination of coffee production or processing. In Tanzania, there are cooperative unions responsible for buying coffee but there is no designated institution for spearheading coffee production or processing. There is no single body to govern or coordinate the three major links to the coffee supply chain. That is, there is no coordination of all links. The literature indicated several constraints facing the agricultural sector in Tanzania and those facing coffee production, processing and marketing. However, it indicates clearly the underlying factors and solutions for such dilemma. All these are the triggers for undertaking this study.

CHAPTER THREE

THEORY AND PRACTICE CONCEPTUAL MODEL DEVELOPMENT

3.1 Introduction

In Chapter Two, the theory and practice of SCM was extensively covered including coffee supply chain in the global perspective as well as coffee supply chain in Kagera Region and in Tanzania in general. Thechapter summarised and discussed various definitions of SCM and their applications. This chapter is about model development; specifically discusses the type of conceptual model to be applied to address coffee SCM challenges facing Kagera Region in Tanzania. Furthermore, it discusses the reasons and advantage of application of conceptual models. Likewise, it highlights the rationale for selecting a particular criterion for evaluating the conceptual models. Finally it presents a summary of the definitions of models, the approach adopted, a detailed presentation of various models and discussion of their advantages.

Modeling provides a logical, abstract template to facilitate the analyst's thoughts. Thus, developing models for problem solving is a common practice for many disciplines. Model formulation is a complex process. Researchers have in the past approached this process from a variety of angles including planning, model structuring, model integration, and model representation, among others. Here, researchers use observations of modelers in an attempt to understand the process. The observations made in the form of protocol analysis, identified three important facets to this process: formulation tasks, control considerations, and the opportunism in the process of formulation. Using these observations, various models were constructed, based on the blackboard paradigm. Many applications in diverse disciplines such as business, engineering, and physics make use of models whereby the system design and implementation details are presented in this chapter. Therefore,, this chapter is about theory and practice of models generically as an application and extension of model variables for creation of the basis for discussing the conceptual SCMmodels. The relationship between stages of product life cycle and supply chain integration are discussed as well.

3.2 Definitions of a Model

Glen (2004) and Ouliaris (2011) define a model as a structure that has been developed by an expert modeler to study the characteristics of a real-world problem. Among different kinds of models that are used including schematic, conceptual analog, mathematical, statistical, economical and verbal. The present research concentrates on the conceptual models, and more precisely on the formulation of the SCMM .

Formulation of a model by expert modelers involves capturing the problem descriptions or semantics, understanding the essential elements by studying structure, selecting a suitable tool with its underlying structure, and finally mapping the problem structure onto the tool structure. The process involves three categories of tasks: formulation tasks, or steps in the construction of the model; control tasks to determine what to do next; and formulation process planning tasks, which refers to control-like concerns only on a longer time horizon. Model formulation can then be thought of as a design activity that is monitored by control and planning processes.

Hayes & Wheelwright (2009) define a model in a number of ways summarised here below:

i. A person who serves as a subject for artwork or fashion, usually in the medium of photography but also for painting or drawing;
ii. A person, usually an attractive female, hired to indicate items or goods to the public, such as items given away as prizes on a TV game show;
iii. A representation of a physical object, usually in miniature;
iv. A simplified representation used to explain the workings of a real world system or event;
v. A style, type, or design;
vi. The structural design of a complex system;
vii. A successful example to be copied, with or without modifications;
viii. An interpretation function which assigns a truth value to each atomic proposition;
ix. Logic or an interpretation which makes a certain sentence true, in which case that interpretation is called a model of that sentence;
x. A particular style, design, or make of a particular product;
xi. Any copy, or resemblance, more or less exact;

Abernathy and Utterbach (2005) explain a model or modelling as:

a) Model (abstract) is a model made of the composition of concepts
b) Scientific modelling is a simplification of relevant aspects of a situation in the real world for its systematic study
c) In economics a model is a theoretical construct representing economic processes
d) In physics a model is a smaller or larger physical copy of an object
e) Model figureis a scale model representing a human, monster or other creature
f) Model (mimicry),is an animal which is imitated often for protection by another species

3.3 Types of Models

There are many kinds of models. Glen (2004) and Fawcett (2000) describe different types of models according to their applications:

3.3.1 Conceptual Models

This is often the first level of abstraction, perhaps a flow chart or simple relationship-graph to indicate the nature of relationships. Models help in early steps toward alternate model development. Conceptual models are of more use to the model builder than the model user if users and builders are not the same people. Conceptual model are more helpful in thinking about reality than in actual decision-making.

3.3.2 Descriptive Models

Models can be used to describe how a system operates. Descriptive models contain no manager-controllable variables but are used to forecast events when independent variables are assumed known. A time series sales-forecast, Sales = f (Time), is a descriptive model, which may be used for budget or logistics planning.

3.3.3 Experimental Models

A model's response in alternative environments can be probed via experimentation. Experimentation is used to explore the response and characteristics of a system; models are developed to use in experiments when it is too costly, destructive, or otherwise infeasible to experiment on the real system.

3.3.4 Exploratory Models

Exploration, as in heuristic programming is a systematic, sequential way of trying out alternatives and improving actions. An exploratory model may be used as a vehicle on which to test a heuristic procedure.

3.3.5 Prescriptive Models

Models are developed to advise managers as to what they should do in a given situation—thus they prescribe. The output of an experiment or exploration may be a prescription or it may not. The model, Sales = f (Advertising), can be used for setting the levels of a controllable variable, advertising, when the related fixed and variable costs are known. Prescriptive models contain controllable variables and can generally be manipulated to obtain good or optimal levels of those variables.

3.3.6 Models in Philosophy and Science

i. Mental Model

In cognitive psychology and philosophy of mind, a mental model is a representation of something in the mind but a mental model may also refer to a nonphysical external model of the mind itself.

ii. Metaphysical models

A metaphysical model is a type of conceptual model which is distinguished from other conceptual models by its proposed scope. A metaphysical model intends to represent reality in the broadest possible way. This

is to say that it explains the answers to fundamental questions such as whether matter and mind are one or two substances; or whether or not humans have free will.

iii. Epistemological Models

An epistemological model is a type of conceptual model whose proposed scope is the known and the knowable and the believed and the believable.

iv. Logical Models

In logic, a model is a type of interpretation under which a particular statement is true. Logical models can be broadly divided into ones which only attempt to represent concepts, such as mathematical models; and ones which attempt to represent physical objects, and factual relationships, among which are scientific models.

Model theory is the study of (classes of) mathematical structures such as groups, fields, graphs, or even universes of set theory, using tools from mathematical logic. A structure that gives meaning to the sentences of a formal language is called a model for the language. If a model for a language moreover satisfies a particular sentence or theory (set of sentences), it is called a model of the sentence or theory. Model theory has close ties to algebra and universal algebra.

v. Mathematical Models

Mathematical models can take many forms, including but not limited to dynamical systems, statistical models, differential equations or game theoretic models. These and other types of models can overlap, with a given model involving a variety of abstract structures. A more comprehensive type of mathematical model uses a linguistic version of category theory to model a given situation. A kin to entity-relationship models, custom categories or sketches can be directly translated into database schemas. The difference is that logic is replaced by category theory, which brings powerful theorems to bear on the subject of modelling, especially useful for translating between disparate models (as functors between categories).

vi. Scientific Models

A scientific model is a simplified abstract view of a complex reality. A scientific model represents empirical objects, phenomena and physical processes in a logical way. Attempts to formalize the principles of the empirical sciences use an interpretation to model reality, in the same way logicians axiomatize the principles of logic. The aim of these attempts is to construct a formal system for which reality is the only

interpretation. The world is an interpretation (or model) of these sciences, only insofar as these sciences are true.[13]

vii. Statistical Models

A statistical model is a probability distribution function proposed as generating data. In a parametric model, the probability distribution function has variable parameters, such as the mean and variance in a normal distribution, or the coefficients for the various exponents of the independent variable in linear regression. A nonparametric model has a distribution function without parameters, such as in bootstrapping, and is only loosely confined by assumptions. Model selection is a statistical method for selecting a distribution function within a class of them, e.g., in linear regression where the dependent variable is a polynomial of the independent variable with parametric coefficients, model selection is selecting the highest exponent, and may be done with nonparametric means, such as with cross validation. In statistics there can be models of mental events as well as models of physical events. For example, a statistical model of customer behaviour is a model that is conceptual, (because behaviour is physical) but a statistical model of customer satisfaction is a model of a concept (because satisfaction is a mental not a physical event).

3.3.7 Economic Models

In economics a model is a theoretical construct that represents economic processes by a set of variables and a set of logical and/or quantitative relationships between them (Ouliaris , 2011). The economic model is a simplified framework designed to illustrate complex processes, often but not always using mathematical techniques. Frequently, economic models use structural parameters. Structural parameters are underlying parameters in a model or class of models. A model may have various parameters and those parameters may change to create various properties. Meanwhile, economic modelling is at the heart of economic theory. Modelling provides a logical, abstract template to help organize the analyst's thoughts. The model helps the economist logically to isolate and sort out complicated chains of cause and effect and influence between the numerous interacting elements in an economy. Through the use of a model, the economist can experiment, at least logically, producing different scenarios to evaluate the effect of alternative policy options or weigh the logical integrity of arguments presented in prose. Certain types of models are extremely useful for presenting visually the essence of economic arguments. No student of economics has sat through a class for very long before a picture is drawn on a chalkboard. The visual appeal of a model clarifies the exposition.

Ouliaris (2011) also describes an economic model as a simplified description of reality, designed to yield hypotheses about economic behavior that can be tested. An important feature of an economic model is that it is necessarily subjective in design because there are no objective measures of economic outcomes. Different economists will make different judgments about what is needed to explain their interpretations of reality. There are two broad classes of economic models namely theoretical and empirical. Theoretical models seek to derive verifiable implications about economic behaviour under the assumption that agents maximize specific objectives subject to constraints that are well defined in the model (for example, an agent's budget). They provide qualitative answers to specific questions such as the implications of asymmetric information (when one side to a transaction knows more than the other) or how best to handle market failures. In contrast, empirical models aim to verify the qualitative predictions of theoretical models and convert these predictions to precise, numerical outcomes. For example, a theoretical model of an agent's consumption behavior would generally suggest a positive relationship between expenditure and income. The empirical adaptation of the theoretical model would attempt to assign a numerical value to the average amount expenditure increases when income increases.

Agarwal (2007) defines an economic model as a set of mathematical equations that describe a theory of economic behavior. The aim of model builders is to include enough equations to provide useful clues about how rational agents behave or how an economy works (see box). The structure of the equations reflects the model builder's attempt to simplify reality—for example, by assuming an infinite number of competitors and market participants with perfect foresight. Economic models can be quite simple in practice: the demand for apples, for example, is inversely related to price if all other influences remain constant. The less expensive the apples, the more are demanded. Or models can be rather complex: some models that seek to predict the real level of output of an economy use thousands of complex formulations that go by such names as nonlinear, interconnected differential equations.

i. How Economists Build Empirical Models

Ouliaris (2011) asserts that empirical economic models have common features. Each will allow for inputs, or exogenous variables, which do not need to be explained by the model. These include policy variables, such as government spending and tax rates, or non policy variables, such as the weather. Then there are the outputs, called dependent variables (for example, the inflation rate), which the model will seek to explain when some or all of the exogenous variables come into play. Every empirical model will also have coefficients that determine how a dependent variable changes when an input changes (for example, the responsiveness of household consumption to a $100 decrease in income tax). Such coefficients are usually

estimated (assigned numbers) based on historical data. Last, empirical model builders add a catchall variable to each behavioural equation to account for idiosyncrasies of economic behaviour at the individual level. (In the example above, agents will not respond identically to a $100 tax rebate.)

Little (2000) and Ouliaris (2011) argue that other economists favour a more nuanced approach. Their preferred equations reflect, in part, what their own experience has taught them about observed data. Economists that build models this way are, in essence, questioning the realism of the behavioural constructs in the more formally derived models. Incorporating experience, however, often means it's impossible to untangle the effect of specific shocks or predict the impact of a policy change because the underlying equations do not explicitly account for changes in agent behaviour. The gain, these same economists would argue, is that they do a better job of prediction (especially for the near term).

ii. A Good Economic Model

Ouliaris (2011) argues that it requires that every model yield precise and verifiable implications about the economic phenomena it is trying to explain. Formal evaluation involves testing the model's key implications and assessing its ability to reproduce stylized facts. Economists use many tools to test their models, including case studies, lab-based experimental studies, and statistics. Still, the randomness of economic data often gets in the way, so economists must be precise when saying that a model successfully explains something. From a forecasting perspective that means errors are unpredictable and irrelevant (zero) on average. When two or more models satisfy this condition, economists generally use the volatility of the forecast errors to break the tie whereby smaller volatility is generally preferred. An objective signal that an empirical model needs to be revised is if it produces systematic forecasting errors. Systematic errors imply that one or more equations of the model are incorrect. Understanding why such errors arise is an important part of the regular assessment economists make of models.

iii. Reasons for Failure of some Economic Models

Ouliaris (2011) believes that all economic models, no matter how complicated, are subjective approximations of reality designed to explain observed phenomena. It follows that the model's predictions must be tempered by the randomness of the underlying data it seeks to explain and by the validity of the theories used to derive its equations. A good example is the ongoing debate over existing models' failure to predict or untangle the reasons for the recent global financial crisis. Insufficient attention to the links

between overall demand, wealth, and—in particular—excessive financial risk taking has been blamed. In the next few years there will be considerable research into uncovering and understanding the lessons from the crisis. This research will add new behavioural equations to current economic models. It will also entail modifying existing equations (for example, those that deal with household saving behaviour) to link them to the new equations modelling the financial sector. The true test of the enhanced model will be its ability to consistently flag levels of financial risk that require a pre-emptive policy response. No economic model can be a perfect description of reality. But the very process of constructing, testing, and revising models forces economists and policymakers to tighten their views about how an economy works. This in turn promotes scientific debate over what drives economic behaviour and what should (or should not) be done to deal with market failures.

iv. Types of Economic Models

There are four types of models used in economic analysis: visual models, mathematical models, empirical models, and simulation models. Their primary features and differences are as discussed here below:

a) Visual Models

Little (2000) and Ouliaris (2011) remark that visual models are simply pictures of an abstract economy; graphs with lines and curves that tell an economic story. They are primarily used in textbooks and teaching, and a reader who has had some exposure to economics has probably seen dozens, if not hundreds of them. Some visual models are merely diagrammatic such as those which show the flow of income through the economy from one sector to another. In other words, they employ a visual device to present a very general economic concept. Most visual models, though, are visual extensions of mathematical models. Implicit in their structure is an underlying mathematical model. Sometimes, when they are presented the mathematics is explained and sometimes they it is not. The models do not normally require some knowledge of mathematics, but still allow the presentation of complex relationships between economic variables. These models are relatively easy to understand, but are somewhat limited in their scope.

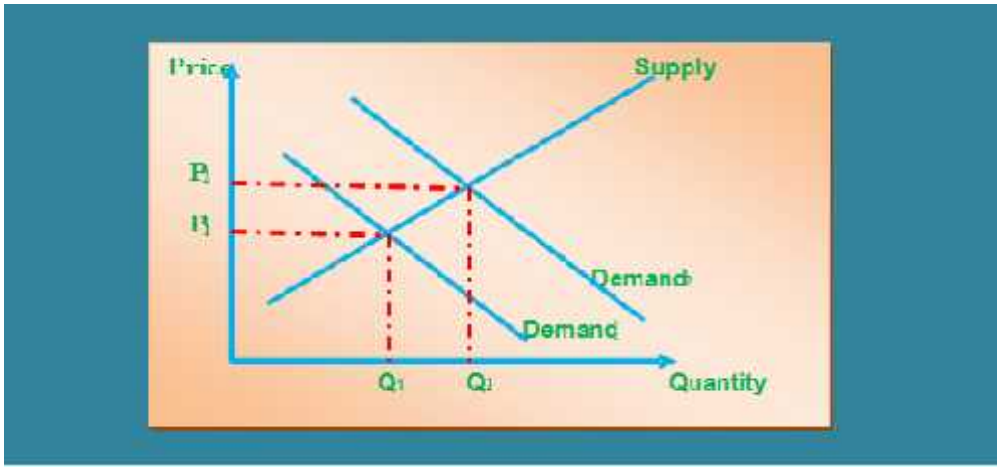

Figure 3.1: An Example of Economic Visual Model

Source: Ouliaris (2011)

Figure 3.1 above presents the elementary Supply and Demand Model with inflationary expectations whereby:

i. The first demand curve ($Demand_1$) represents demand prior the formation of inflationary expectations;
ii. The second demand curve ($Demand_2$) represents the effects of inflationary expectations upon demand;
iii. Prices and output finally settle at P_2 and Q_2 higher in both cases

b) Mathematical Models

Little (2000) contends that mathematical models are purely the most formal and abstract of the economic models. These are systems of simultaneous equations with an equal or greater number of economic variables. Some of these models can be quite large. Even the smallest will have five or six equations and as many unknown variables. The manipulation and use of these models require a good knowledge of algebra or calculus. For example, a very simple microeconomics model would include a supply function (explaining the behaviour of producers, or those who supply commodities to the market), a demand curve (explaining the behaviour of purchasers) and an equilibrium equation, specifying the simple conditions that must be met if the model's equilibrium is to be satisfied.

The variables in a model such as this represent a type of economic activity (such as demand) or data (information) that either determines or is determined by that activity (such as a price or interest rate).

Variables can usually be classified as endogenous or exogenous. An endogenous variable is one that is determined within the model, or by the model's solution. Its value becomes known when the model is solved. For example, if the final level of demand is determined by the model's solution, demand is an endogenous variable. On the other hand, if the value of a variable comes from outside the model, if its value is preset, it is an exogenous variable. In macroeconomics, many policy variables, such as the income tax rate or money supply growth rate, are treated as exogenous. For example, the money supply growth rate is regarded as exogenous because it is set by policy-makers rather than determined by the dynamics of the model. Below is an Illustration 3.2 offered by Ouliaris (2011) representing an elementary mathematical model. It is the mathematical version of the visual model shown in Figure 3.1. Here it should made clear that it as a variation of the simple supply-and-demand model mostly discussed in microeconomics, where the purpose is to determine equilibrium price and quantity in a market.

(1) $S = a + bP$

(2) $DX| c Z|dP\Gamma eIE$

(3) $S X|D XQ$

(4) $P^0 = \frac{(c + eIEZ a)}{(b\Gamma d)}$

(5) $Q^0 = a + bP$

From the above illustration, the mathematical model has three equations, a supply equation (1), a demand equation (2), and an equilibrium identity (3) which declares that at equilibrium supply will equal demand (and is represented by 'Q', for quantity.) There are three endogenous variables with unknown values; price, quantity supplied, and quantity demanded. There is one exogenous value, inflationary expectations (IE) in the demand equation, the value of which would have to be provided before the model could be solved. The values a, b, c, d, and e are called coefficients or parameters. The solution values for price and quantity are shown in equations (4) and (5). As mentioned above, this simple model is provided merely for illustration. In most cases, reliable macroeconomic mathematical models are much larger and more complex than this.

From the foregoing, Equation (1) is the supply function; and equation (2) is the demand equation which includes the variable for inflationary expectations; whereas equation (3) indicates that at the equilibrium,

supply will be equal to demand. Therefore,, by solving these three equations for P through substitution, we obtain the solution for Price in equation (4) and quantity in the equation (5)

c) Empirical Models

Empirical models are mathematical models designed to be used with data (Ouliaris, 2011). With an empirical model, however, data is gathered for the variables, and using accepted statistical techniques, the data are used to provide estimates of the model's values. For example, suppose in an economic study the following question is asked: "What will happen to investment if income rises by one percent?" The purely mathematical model might only allow the analyst to say, "Logically, it should rise." The user of the empirical model, on the other hand, using actual historical data for investment, income, and the other variables in the model, might be able to say, "By my best estimate, investment should rise by about two percent."3 For example, after manipulating the simple supply-and-demand model shown above in Figure 3.1 and represented mathematically in Illustration 3.2, and supposing this to represent an actual market for a commodity such as an automobile, with data available, the econometrician might estimate that if inflationary expectations were to rise by ten percent, demand for the auto would shift and the price of this product would rise by six percent.4. Empirical models are advanced and cannot be understood unless the student has an introductory background in statistics. They will not be discussed in this text but are mentioned because they are important for more advanced research and are largely built from mathematical models.

d) Simulation Models

According to Abernathy and Utterbach (2005) and Ouliaris (2011) simulation models embody the features of mathematical models without requiring that the user be proficient in mathematics. These models are fundamentally mathematical (the equations of the model are programmed in a programming language such as Pascal or C++) but the mathematical complexity is transparent to the user. The simulation model usually starts with initial or "default" values assigned by the program or the user, then certain variables are changed or initialized, then a computer simulation is done. The simulation, of course, is a solution of the model's equations. The computerized simulation model can show the interaction of numerous variables all

3 Empirical Models produce only estimates, refined guesses, and the language that evaluates the likely accuracy of the estimate is much more precise and technical than is suggested here. This technique is taught in the specialized field of economics called econometrics.

4 Again, this example is for illustration only. An estimate based upon so simple a model would be entirely unreliable.

at once, including hidden feedback and secondary effects that are not so apparent in purely mathematical or visual models. With such simulations, the careful user, especially if guided by a good text, can reason through the complicated chains of influence without necessarily understanding the underlying mathematics. Therefore, such models are quite useful in the research work.

3.3.8 Models in Systems Architecture

A system model describes and represents the structure, behaviour and more views of a system. According to Bourgeois (2010), a system model can represent multiple views of a system by using two different approaches. The first one is the non-architectural approach and the second one is the architectural approach. The non-architectural approach respectively picks a model for each view. The architectural approach, also known as system architecture, instead of picking many heterogeneous and unrelated models, will use only one integrated architectural model.

3.3.9 Business Process Models

According the opinion by Bourgeois (2010 business process models are illustrated by Figure 3.2 as follows:

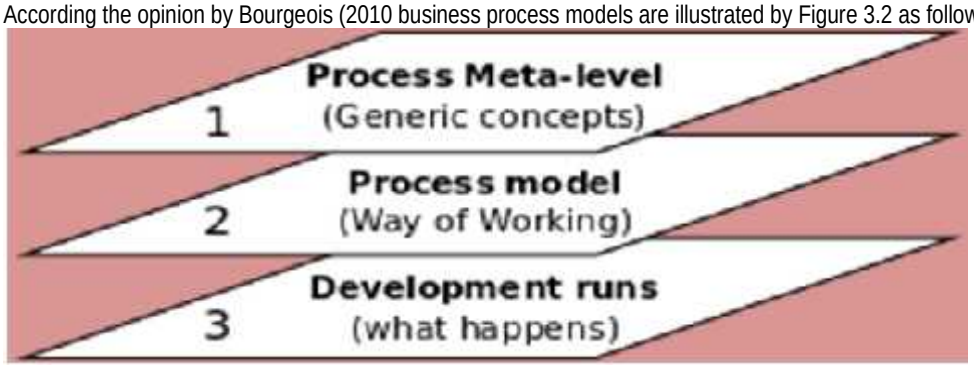

Figure 3.2: Abstraction of Business Process Modelling

Source: Bourgeois (2010)

In business process modelling, the enterprise process model is often referred to as the business process model. Process models are core concepts in the process engineering discipline. Process models are:

a) Processes of the same nature that is classified together into a model.
b) A description of a process at the type level.
c) Since the process model is at the type level, a process is an instantiation of it.

The same process model is used repeatedly for the development of many applications and thus, has many instantiations. One possible use of a process model according to Bourgeois (2010) is to prescribe how

things should be done in contrast to the process itself which is really what happens. A process model is roughly an anticipation of what the process will look like. What the process shall be will be determined during actual system development.

3.3.10 Conceptual Models of Human Activity Systems

as clarified by Fawcett (2000) suggests that conceptual models of human activity systems are used in soft systems methodology (SSM) which is a method of systems analysis concerned with the structuring of problems in management. These are models of concepts; the authors specifically state that they are not intended to represent a state of affairs in the physical world. They are also used in Information Requirements Analysis (IRA) which is a variant of SSM developed for information system design and software engineering.

3.3.11 Logico-linguistic Models

Fawcett (2000) further explains that Logico-linguistic modelling is another variant of SSM that uses conceptual models. However, this method combines models of concepts with models of putative real world objects and events. It is a graphical representation of modal logic in which modal operators are used to distinguish statement about concepts from statements about real world objects and events.

3.3.12 Data Models

i. Entity-relationship model

In software engineering, an entity-relationship model (ERM) is an abstract and conceptual representation of data (Gary, 2010; Glen, 2004). Entity-relationship modelling is a database modelling method, used to produce a type of conceptual schema or semantic data model of a system, often a relational database, and its requirements in a top-down fashion. Diagrams created by this process are called entity-relationship diagrams, ER diagrams, or ERDs. Entity-relationship models according to Gary (2010) and Glen (2004) have had wide application in the building of information systems intended to support activities involving objects and events in the real world. In these cases they are models that are conceptual. However, this modelling method can be used to build computer games or a family tree of the Greek Gods, in these cases it would be used to model concepts.

ii. Domain Models

Fawcett (2000) observes that domain models are types of conceptual models used to depict the structural elements and their conceptual constraints within a domain of interest (sometimes called the problem domain). A domain model includes the various entities, their attributes and relationships, plus the constraints governing the conceptual integrity of the structural model elements comprising that problem domain. A domain model may also include a number of conceptual views, where each view is pertinent to a particular subject area of the domain or to a particular subset of the domain model which is of interest to a stakeholder of the domain model. Like entity-relationship models, domain models can be used to model concepts or to model real world objects and events.

3.3.13 Mathematics and Computer Science

A mathematical model is a description of a system using mathematical concepts and language in other words it is a 3D model which is a representation of any three-dimensional surface via specialized software. Some scholars such as Abernathy and Utterbach (2005) perceive a mathematical model (mathematical logic) as a set along with a collection of finitary operations and relations that are defined on it. They further argue that a model theory is the study of mathematical structures using tools from mathematical logic. They also consider Computer model as a simulation to reproduce behaviour of a system and conceptual model (computer science) as a representation of entities and relationships between them. They describe both mathematical and computer science is a solid modelling or a consistent set of principles for mathematical and computer modelling of three-dimensional solids. Thus, they relate them with statistical model in applied statistics, a parameterized set of probability distributions.

3.3.14 People and Arts

In terms of people and arts, Keats and Hitt (2012) believe that the word Model refers to the following:

i. a person in a role to promote, display or advertise commercial products or to serve as a visual aide for people who are creating works of art;
ii. a person who poses for a visual artist as part of the creative process; and
iii. role model, a person who serves as a behavioural or moral example to others.

3.4 Uses of Models

There are so many different uses for models. They can be used to entertain and amuse (as dolls, model airplanes). The important point here is that different types of models do exist. For some, use of a model

only implies replacement or elimination of human thought at some stage of a decision making process. By model relativism theory use can mean aid in teaching or idea operation, aid, however minor, in decision making or aid in theory construction or testing. In this (somewhat digressive) discussion of brand switching models, we have described at least three uses. There may well be more, but Keats and Hitt (2012) propound that those model uses are sufficiently different and independently important.

3.4.1 Pedagogic

Models are for use in teaching and explanation. These models should be simple, unencumbered by details, easy to follow and only, perhaps, suggestive of real applications. Models should be designed to help structure thought at the expense of application-detail.

3.4.2 Managerial

Models are used for representation of the situation in order to be understandable and acceptable. At one limit, it is equivalent to the theory representative use; at the other extreme it may be even simpler than pedagogic models.

3.5 Advantages of Application of Models

As it was discussed earlier modelling provides a logical and abstract template to help organize the analyst's thoughts. A model helps the economist logically isolate and sort out complicated chains of cause and effect and influence between the numerous interacting elements in an economy. Through the use of a model, the economist can experiment, at least logically, producing different scenarios, attempting to evaluate the effect of alternative policy options or weighing the logical integrity of arguments presented in prose. Certain types of models are extremely useful for presenting visually the essence of economic arguments. No student of economics has sat through a class for very long before a picture is drawn on a chalkboard. The visual appeal of a model clarifies the exposition.

3.6 Conceptual Models

The term conceptual model is ambiguous. It could mean "a model of concept" or it could mean "a model that is conceptual" (Bourgeois, 2010; Fawcett 2000). A distinction can be made between what models are and what models are models. With the exception of iconic models, such as a scale model of Winchester Cathedral, most models are concepts. But they are mostly intended to be models of real world states of affairs. The value of a model is usually directly proportional to how well it corresponds to a past, present,

future, actual or potential state of affairs. A model of a concept is quite different because in order to be a good model it need not have this real world correspondence. In artificial intelligence conceptual models and conceptual graphs are used for building expert systems and knowledge-based systems, here the analysts are concerned to represent expert opinion on what is true not their own ideas on what is true.

In the context of this study therefore, the term conceptual model refers to a descriptive structure or diagram that indicates the key elements in the system of interest and the hypothesized relationships between them. In other words a model is a diagram of proposed causal linkages among a set of concepts believed to be related to a particular world problem. Often, a model is an Integration of theories from multiple disciplines. Thus, according to this definition, conceptual model are:

- Visual representation of the elements of a theory
- A conceptual framework for organizing and integrating information
- A conceptual structure successfully developed in one field and applied to some other field to guide research and practice

Bourgeois (2010) and Fawcett (2000) believe that conceptual models (models that are conceptual) range in type from the more concrete, such as the mental image of a familiar physical object, to the formal generality and abstractness of mathematical models which do not appear to the mind as an image. Conceptual models also range in terms of the scope of the subject matter that they are taken to represent. A model may, for instance, represent a single thing such as the Statue of Liberty, whole classes of things, and even very vast domains of subject matter such as the physical universe. The variety and scope of conceptual models is due to the variety of purposes had by the people using them.

3.6.1 Purposes of Conceptual Models

Fawcett (2000) explains that a conceptual model's primary objective is to convey the fundamental principles and basic functionality of the system in which it represents. Also, a conceptual model is always developed in such a way that it provides an easily understood system interpretation for the models users. A conceptual model, when implemented properly, should satisfy four fundamental objectives namely:

i. Enhance an individual's understanding of the representative system;
ii. Facilitate efficient conveyance of system details between stakeholders;
iii. Provide a point of reference for system designers to extract system specifications; and
iv. Document the system for future reference and provide a means for collaboration.

The conceptual model plays an important role in the overall system development life cycle. Figure 3.3 depicts the role of the conceptual model in a typical system development scheme. It is clear that if the conceptual model is not fully developed, the execution of fundamental system properties may not be implemented properly, giving way to future problems or system shortfalls. These failures do occur in the industry and have been linked to; lack of user input, incomplete or unclear requirements, and changing requirements. Those weak links in the system design and development process can be traced to improper execution of the fundamental objectives of conceptual modelling. The importance of conceptual modelling is evident when such systemic failures are mitigated by thorough system development and adherence to proven development objectives/techniques.

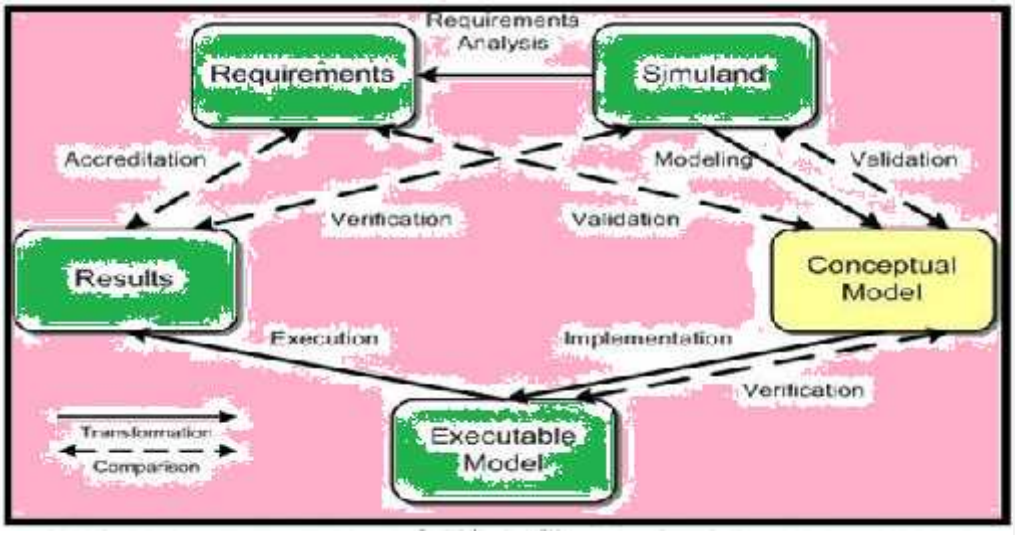

Figure 3.3: The Role of the Conceptual Model in System Development Scheme

Source: Fawcett (2000)

In different occasions, a conceptual model is made due to a number of reasons including that it:

- is key for developing research hypotheses, identifying variables, and interpreting research results;
- is essential for integrated interdisciplinary research;
- organises and synthesises related factors into a coherent, simplified representation
- make alternative routes to an endpoint explicit;
- summarises an existing body of literature and/or proposes of new research directions; and
- guides formulation of hypotheses for research questions.

However, as reflected in Figure 3.3 above, it is important to note that this study will focus on developing a conceptual model for SCM of coffee but not an executable model for SCM of coffee industry in Kagera. This will be done under the reason that the conceptual model to be developed is not for a specific organisation and is not commissioned by any organisation. Thus, the model is not for implementation. The executable model may be developed if a specific body has requested for its development and the units or players fixed in the model are not imaginary. Therefore, the conceptual model to be developed by this study is first step in developing more detailed and executable model.

Donald (2009) is of the opines that it is important to note some critical advantages of conceptual models:

- When introducing a new topic regardless of whether the ultimate goal is to develop the topic qualitatively or quantitatively.
- When equations for some process being studied seem to obscure understanding it is a good idea to step back a bit and discuss a conceptual model of the processes. Actually, it is typically best to develop a conceptual framework for understanding before introducing equations.
- To help explain and discuss interesting features in data sets;
- Descriptive model of a system based on qualitative assumptions about its elements, their interrelationships and system boundaries.

From the foregoing opinion, development of a new conceptual model can facilitate business grow much faster for profit making. Therefore, conceptual models are used to describe complex situations, which is effective in communicating important and relevant facts.

3.6.2 Tips for Building Conceptual Models

Donald (2009) emphasizes that it should be remembered that models are quite individualized; there is no one right representation. Thus in building or developing the conceptual models, it should be considered that relationships depicted are driven by a combination of theory and evidence. To develop a smarter conceptual model, therefore, the modeller should start with a basic and simple model structure and add additional sets of variables as needed. It is further advised that a well structured model is developed by determining the desired level of variable specificity, based on the purpose of the model, clarity regarding relationships among variables and the measurements that may be employed. Generally, values for

variables should not be included (e.g. age >65, disease duration <10 years). There should also be sharing of the developed model with colleagues about its content for feedback.

3.6.3 Special Considerations in Building a Conceptual Model

Glen (2004) and Little (2000) list the basic facts that are important for a researcher to understand at the beginning of learning how to develop conceptual models as:

i. Development of conceptual models is first step in developing more detailed quantitative models;
ii. Interactive development of conceptual models can be used very effectively as an interactive engagement environment;
iii. If some of the audience is unfamiliar with the development and validation of conceptual models, it helps them understand a different physical process.
iv. The development of conceptual models can help introduce the terminologies and to a conceptual understanding of systems thinking and modeling.

Table.3.1 indicates the special considerations in developing a conceptual model

Table 3.1: Special Considerations for Developing a Conceptual Model

Accurate Representation of the Science or Theory	Stylistic Elements for Communicating Relationships and Emphasis
• What are the relationships among the variables depicted? – Independent, dependent – Antecedents, predictor – Moderators, mediators	• Use of different shapes and object sizes; placement
• Is there an ordering of the variables (e.g. rank, sequence or temporal)	• Use of border styles • Use of lines (styles, sizes) to denote connectivity
• Are there interactions among sets of variables?	• Use of arrows (styles, sizes) for directionality • Use of emphasized text (bold, underline, case)

Source: Glen (2004)

3.6.4 Conceptual Modelling Techniques

As systems have become increasingly complex, the role of conceptual modelling has dramatically expanded. With that expanded presence the study finds that the idea by Cohen and Whang (2007) that the effectiveness of conceptual modelling at capturing the fundamentals of a system is being realized. Building on that realization, numerous conceptual modelling techniques have been created. These techniques can be applied across multiple disciplines to increase the users understanding of the system to be modelled. A few techniques are briefly described. However, many more exist or are being developed. The commonly used conceptual modelling techniques and methods include Workflow Modelling, Workforce Modelling, Rapid Application Development, Object Role Modelling, and Unified Modelling Language (UML) (Cohen and Whang, 2007).

i. Data Flow Modelling

Data flow modelling (DFM) is a basic conceptual modelling technique that graphically represents elements of a system. DFM is a fairly simple technique. However, like many conceptual modelling techniques, it is possible to construct higher and lower level representative diagrams. This argument is also advocated by Ellram (2011a) and Ellram (2011b) that the data flow diagram usually does not convey complex system details such as parallel development considerations or timing information, but rather works to bring the major system functions into context. Data flow modelling is a central technique used in systems development that utilizes the Structured Systems Analysis and Design Method (SSADM).

As described above, data flow modelling technique is used in system development which is important in SCM model as there are systems in the supply chain. This is among the focus of development of SCM Model in this study.

ii. Entity Relationship Modelling

Entity-relationship modelling (ERM) is a type of conceptual modelling technique used primarily for software system representation (Ellram, 2011a). Entity-relationship diagrams, which are a product of executing the ERM technique, are normally used to represent database models and information systems. The main components of the diagram are the entities and relationships. The entities can represent independent functions, objects, or events. The relationships are responsible for relating the entities to one another. To form a system process, the relationships are combined with the entities and any attributes needed to further describe the process. Multiple diagramming conventions exist for this technique; IDEF1X, Bachman, and

Express, to name a few. These conventions are just different ways of viewing and organizing the data to represent different system aspects. In the conceptual SCM Model, relationship among entities is very crucial and is clearly reflected. The entities are key players such as suppliers, distributers, transporters, financiers, marketers, planners and many other players in the execution of the model. Therefore, this technique is important in the development of the conceptual coffee SCM Model as it incorporates the functions of different entities of the supply chain.

iii. Event-Driven Process Chain

The event-driven process chain (EPC) is a conceptual modelling technique which is mainly used to systematically improve business process flows. Like most conceptual modelling techniques, the event driven process chain consists of entities/elements and functions that allow relationships to be developed and processed. More specifically, the EPC is made up of events which define what state a process is in or the rules by which it operates. In order to progress through events, a function/ active event must be executed (Ellram, 2011b). Depending on the process flow, the function has the ability to transform event states or link to other event driven process chains. Other elements exist within an EPC, all of which work together to define how and by what rules the system operates. The EPC technique can be applied to business practices such as resource planning, process improvement, and logistics. Taking into consideration that SCMM consists of many players with different objectives but with the intention to deliver quality product to the consumer, this kind of business must be regularly improved and should follow business rules. Thus, this technique fits the development of conceptual coffee SCMM.

iv. Joint Application Development

The Dynamic Systems Development Method (DSDM) uses a specific process called Joint Application Design (JAD) to conceptually model a systems life cycle. JAD is intended to focus more on the higher level development planning that precedes a projects initialization. The JAD process calls for a series of workshops in which the participants work to identify, define, and generally map a successful project from conception to completion. This method has been found to not work well for large scale applications, however smaller applications usually report some net gain in efficiency. As the description states in this modelling technique “the participants work to identify, define, and generally map a successful project from conception to completion” this one of the thrust of the SCM Model.

v. Place Transition Net

Also known as Petri Nets, this conceptual modelling technique allows a system to be constructed with elements that can be described by direct mathematical means. The petri net, because of its nondeterministic execution properties and well defined mathematical theory, is a useful technique for modelling concurrent system behavior, i.e. simultaneous process executions. This kind of modelling technique is not suitable for the conceptual coffee SCM model that will be developed in this study as it focuses on mathematical aspects.

vi. State Transition Modelling

State transition modelling makes use of state transition diagrams to describe system behavior. These state transition diagrams use distinct states to define system behaviour and changes. Most current modelling tools contain some kind of ability to represent state transition modelling. The use of state transition models can be most easily recognized as logic state diagrams and directed graphs for finite state machines. The conceptual coffee SCM Model to be developed under this study will not apply this modelling technique.

3.6.5 Special Considerations

Because the conceptual modelling method can sometimes be purposefully vague to account for a broad area of use, the actual application of concept modelling can become difficult. To alleviate this issue, and shed some light on what to consider when selecting an appropriate conceptual modelling technique, the framework proposed by Birou, Fawcett and Magnan (2008) are discussed in the following sections.

i. Considering Technique Evaluation and Selection

Before evaluating the effectiveness of a conceptual modelling technique for a particular application, an important concept must be understood; comparing conceptual models by way of specifically focusing on their graphical or top level representations is short-sighted. Birou, Fawcett and Magnan (2008) make a good point when arguing that the emphasis should be placed on a conceptual modelling language when choosing an appropriate technique. In general, a conceptual model is developed using some form of conceptual modelling technique. That technique will utilize a conceptual modelling language that determines the rules for how the model is arrived at. Understanding the capabilities of the specific language used is inherent to properly evaluating a conceptual modelling technique, as the language reflects the techniques descriptive ability. Also, the conceptual modelling language will directly influence the depth at which the system is capable of being represented, whether it be complex or simple.

ii. Considering Affecting Factors

Building on some of their earlier work, Birou, Fawcett and Magnan (2008) acknowledge some main points to consider when studying the affecting factors: the content that the conceptual model must represent, the method in which the model will be presented, the characteristics of the models users, and the conceptual model languages specific task. The conceptual models content should be considered in order to select a technique that would allow relevant information to be presented. The presentation method for selection purposes would focus on the techniques ability to represent the model at the intended level of depth and detail. The characteristic of the models users or participants is an important aspect to consider. A participant's background and experience in the view of Ellram, (2011a) should coincide with the conceptual models complexity, else misrepresentation of the system or misunderstanding of key system concepts could lead to problems in that systems realization. The conceptual model language task will further allow an appropriate technique to be chosen. The difference between creating a system conceptual model to convey system functionality and creating a system conceptual model to interpret that functionality could involve to completely different types of conceptual modelling languages.

iii. Considering Affected Variables

Birou, Fawcett and Magnan (2008) expand the affected variable content of their proposed framework by considering the focus of observation and the criterion for comparison. The focus of observation considers whether the conceptual modelling technique will create a "new product", or whether the technique will only bring about a more intimate understanding of the system being modeled. The criterion for comparison would weigh the ability of the conceptual modelling technique to be efficient or effective. A conceptual modelling technique that allows for development of a system model which takes all system variables into account at a high level may make the process of understanding the system functionality more efficient, but the technique lacks the necessary information to explain the internal processes, rendering the model less effective.

When deciding which conceptual technique to use, the recommendations by Birou, Fawcett and Magnan (2008) can be applied in order to properly evaluate the scope of the conceptual model in question. Understanding the conceptual models scope will lead to a more informed selection of a technique that properly addresses that particular model. In summary, when deciding between modelling techniques,

answering the following questions would allow one to address some important conceptual modelling considerations.

1. What content will the conceptual model represent?
2. How will the conceptual model be presented?
3. Who will be using or participating in the conceptual model?
4. How will the conceptual model describe the system?
5. What is the conceptual models focus of observation?
6. Will the conceptual model be efficient or effective in describing the system?

Another function of the simulation conceptual model is to provide a rational and factual basis for assessment of simulation application appropriateness. Essentially, from the explanations under the whole of section 3.6, there is only one conceptual model except that there are different approaches or techniques in the modelling or development of the conceptual models depending on the activity that the modeller intends to undertake. This is so from the fact that an engineer will design a conceptual model using different technique from the economist who intends to solve a business challenge.

3.7 Supply Chain Management Models

In the preceding sections, the study has covered the meaning and different types of models. The idea is to find out the type of model that could be adopted in order to address the constraints facing the coffee supply chain in the Kagera Region. This study proposed the conceptual model that plays an important role in the overall system development life cycle. If the conceptual model is not effectively developed, the execution of fundamental system properties may not be implemented properly, giving way to future problems or system shortfalls. These failures do occur in the coffee industry and have been linked to lack of user input, incomplete or unclear requirements and changing requirements. Thus, from what have been covered under theory and practice of models, it is necessary to develop a conceptual SCM model in order to address the challenges facing the coffee SCM in Kagera Region.

Business models such as SCMMs are widely used because they allow the analyst to simplify a situation according to the situation on ground. Therefore,, Development of the SCMM is the most significant contribution to the delivery of quality goods and services especially quality coffee from Kagera Region. SCMMs are crucial to the global economy. They represent a unique discipline responsible for supporting

the global network of delivering of products and services across the entire supply chain, from raw materials to end customers.

Vickery, et al (2011) comment that SCM models are crucial in the design, planning, execution, control, and supervision of supply chain activities with the objectives of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand, and measuring performance globally. The structure of any SCMM follows guidelines set by the administration of a particular organisation or Department. The SCM model is visually represented in a diagram for easy reference, as seen on the preceding sections. The model is organized into tiers of competencies and includes descriptions of the activities and behaviours associated with each competency. The SCM Model defines competency as the capability to apply or use a set of related knowledge, skills, and abilities required to successfully perform 'critical work functions' or tasks in a defined work setting. In many cases, the actors or players outlined in the model are prescribed by the planning and operations management sections of the particular organisation.

Ellram (2011b) record that manufacturing and distribution companies in a wide range of industries have begun to appreciate this distinction. As a result, they are seeking to develop some models in order to implement their corporate plans for achieving their predetermined supply chains and operating them more efficiently. An essential component of these SCM models, which can unravel the complex interactions and ripple effects that make SCMdifficult and important are discussed. They are the only analytical tools capable of fully evaluating large, numerical databases to identify optimal, or demonstrably good, plans. In addition to identifying cost minimizing or net revenue maximizing plans, optimization models can measure the tradeoffs among these objectives and cost, service, quality, and time.

Birou, Fawcett and Magnan (2008) observe that the application of an SCM model in any organisation requires the construction of an optimization modelling system. A key element in such a system is the supply chain decision database, which is derived from, but significantly different than, the organisation's corporate strategy. It is constructed from aggregate descriptions of the organisational products, customers and vendors. It contains:-

i. direct and indirect cost relationships,
ii. sub-models of production, transportation, warehousing and inventory management,
iii. cost and capacity information about commodities, parts, products offered by vendors,
iv. order information and forecasts of demand for finished products.

Ellram (2011b) reports that a SCMM combines data inputs with outputs from model optimizations in creating graphical mapping representations of the company's current and future supply chain structure and activities. Thus, the aim of this section is to examine in detail the roles of models and modelling systems in supporting institutions to improve the management of their supply chains. Principles of supply chain decisions and modelling system implementation will be illustrated by successful applications. The applications will be concerned with businesses strategic, tactical, and operational levels of planning ways in which organizations must adopt certain models in order to exploit their effectiveness. In recent years, the number and scope of successful applications of models and modelling systems have grown significantly.

3.7.1 Overview of Supply Chain Models and Modelling Systems

In preceding sections the need to augment SCM models with efficient performance of business organisations for the purposes of integrated supply chain planning was highlighted. Mejza and Ellram (2011b) describe two types of SCM models namely Descriptive and Normative as follows:

i. Descriptive Models

Descriptive Models are those that modelling practitioners develop for better understanding of functional relationships in the company and the outside world. Descriptive models include

a) forecasting models that predict demand for the company's finished products, the cost of raw materials, or other factors, based on historical data;
b) cost relationships that describe how direct and indirect costs vary as functions of cost drivers;
c) resource utilization relationships that describe how manufacturing activities consume scarce resources; and
d) simulation models that describe how all or parts of the company's supply chain will operate over time as a function of parameters and policies.

This list is representative but not exhaustive of the wide range of descriptive models that the modelling practitioner might create to better understand a company's supply chain.

ii. Normative Models

These are models that modelling practitioners develop to help managers make better decisions. The term normative refers to processes for identifying norms that the company should strive to achieve. The viewpoint here is that normative models and optimization models are synonyms. Furthermore, optimization

models are viewed as a synonym for mathematical programming models, a respected class of mathematical models that have been studied by researchers and practitioners in the field of operations research for many years. Henceforth, we will use the term optimization models to refer to models that might otherwise be termed normative or mathematical programming.

The construction of optimization models requires descriptive data and models as inputs. Clearly, the supply chain plan suggested by an optimization model will be no better than the inputs it receives, which is the familiar “garbage-in, garbage-out” problem. In many applications, however, the modelling practitioner is faced with the reality that although some data is not yet as accurate as it might be, using approximate data is better than abandoning the analysis. In other words, many model implementation projects pass through several stages of data and model validation until sufficient accuracy is achieved.

Cohen and Whang (2007) suggest that Supply chain managers should also realize that the development of accurate descriptive models is necessary but not sufficient for realizing effective decision-making. For example, accurate demand forecasts must be combined with other data in constructing a global optimization model to determine which plants should make which products to serve which distribution centres and markets so that demand is met at minimal supply chain cost. Similarly, an accurate management accounting model of manufacturing process costs is necessary but not sufficient for the purpose of identifying an optimal production schedule. Of course, to be applied a model conceptualized on paper must be realized by programs for generating a computer readable representation of it from input data. In addition, this representation must be optimized using a numerical algorithm, and the results gleaned from the output of the algorithm must be reported in managerial terms. Programs for viewing and managing input data and reports must be implemented. Depending on the application, the modelling system must also be integrated with other systems that collect data, disseminate reports, or optimize other aspects of the company’s supply chain. In short, an optimization model provides the inspiration for implementing, validating and applying a modelling system, but the great bulk of the work is required by these subsequent tasks.

Cohen and Whang (2007) maintains that mathematical programming methods provide powerful and comprehensive tools for crunching large quantities of numerical data describing the supply chains of many companies. Experienced practitioners generally agree about what is, or is not, an accurate and complete model for a particular class of applications. Unfortunately, since most managers are not modelling experts,

they can easily be taken in by systems that translate input data into supply chain plans using ad hoc, mediocre models and methods.

The opportunity loss incurred by applying a mediocre modelling system is not simply one of mathematical or scientific purity Birou, Fawcett and Magnan (2008). Although a mediocre system may identify plans that improve a company's supply chain operations, a superior system will often identify much better plans, as measured by improvements to the company's bottom line. For a company with annual sales in the hundreds of millions, rigorous analysis with a superior modelling system can add tens of millions dollars to the company's net revenue, while analysis with a mediocre system may identify only a small portion of this amount. Such returns justify the time and effort required to develop and apply a superior system. Thus, with the goal of converting non-experts to more knowledgeable consumers of models and modelling systems, we provide in later chapters a detailed introduction to mathematical modelling of supply chain decision problems. We also provide a brief exposure to algorithms for optimizing these models. The mathematical development uses algebraic methods that are taught in high school, which should render it no more painful to the reader than that he or she experienced during a typical algebra class before.

A more subtly in the opinion by Birou, Fawcett and Magnan (2008) related point is that good models and modelling systems expand the consciousness of managers and analysts regarding decision options and methods for improving supply chain design and operations. Their expanded consciousness relies on translations of qualitative and quantitative concepts from diverse management disciplines into modelling constructs employed by a modelling system. These disciplines and the relevant concepts are discussed briefly in the following section, and in greater detail throughout the book. Many of the ideas presented in this book stem from the author's experiences in projects where optimization models were applied. Of particular relevance are applications of an off-the-shelf modelling system, called SLIM/2000, for analyzing strategic and tactical supply chain problems. The principles used in constructing and applying this system, and the connections between its optimization models and diverse management disciplines provided a cornerstone to our thinking as reflected in Figure 3.4:

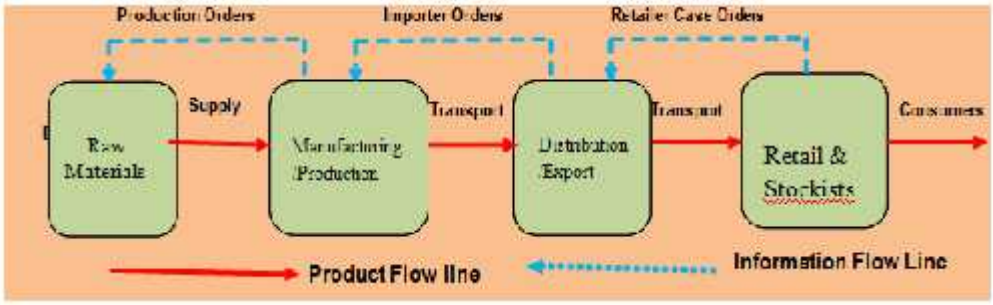

Figure: 3.4.A Traditional Approach of the Supply Chain Model

Source: Ellram (2011b)

3.7.2 Requirements and Design of a Generic Supply Chain

Implementation of a supply chain model requires a modelling view of the target system. Lee, Padmanabhan and Whang (2007) agree that this is also true in the case of the supply chain system. Their literature proposes modelling a supply chain system from different views relevant for its performance evaluation using simulation.

3.7.3 Types of Modelling Views

The literature by LaLonde (2000), introduces four modelling views for supply chain systems namely Organization, Control, Activity, and Communication. These viewpoints and their interactions help determine the requirement for supply chain simulation. A supply chain system has four types of modelling views. This section describes a modelling framework for supply chain simulation based on these views. The members in supply chain systems are categorized into six types by way of organization view: These are “supplier,” “source,” “storage,” “deliverer,” “consumer,” and “planner.” Individuals of these are further classified into two types by way of control view: These are “stock-driven” and “schedule-driven.” Stock-driven member autonomously work to replenish its relevant inventory stock. Its inventory stock level is often defined as its replenishment point. The schedule-driven member basically works to operational orders given by the planner. Based on this principle, we can define modelling base frame as shown in Table 3.2.

Galtorna (2002) points out that a supply chain system is composed of member companies organized in a chain or a network. Some of these members belong to the same company, and some of them are independent companies. These members are classified into several categories according to their

organizational functions. Although there are many supply chain system participants, they can be classified into six types of organizations. Supply chain members would be classified into the following abstracted types.

- Supplier: "Supplier" owns manufacturing systems to produce products or parts. This organization gets materials from its up-stream chain members, transforms them into value-added objects, and outputs the value-added objects.
- Source: "Source" is a specific supplier that generates materials. This organization is a starting stage of material flows in a chain. In many cases, this type of member procures raw materials from outside organizations; however, its operation is abbreviated in the model.
- Storage: "Storage" is a supplier that stores materials until another chain member requires them. A warehouse in a distribution system network is a typical example.
- Deliverer: "Deliverer" transports materials and products from a particular chain member to another. A 3rd Party Logistics (3PLs) company is one of typical examples of them.
- Consumer: "Consumer" purchases products. It generates orders to be provided, and give the orders to planner. This organization is the end stage for material flows.

One supply chain member company may participate in multiple roles. For example, a logistics provider may provide the storage and deliverer roles, each at multiple points in the supply chain. Similarly a member company may own multiple "supplier" roles.

3.7.4 Control View

The material flow in the supply chain can be viewed using control policies within each organization. Section 2 described material management strategies in manufacturing operations. These operational policies can be applied at a supply chain level and within the operations of each particular chain member. We define here two broad operational policies that control operations of members in a supply chain system: "Schedule driven control" and "Stock-driven control" used primarily with push and pull approaches respectively.

i. Schedule-Driven Control

This control method is based on a central Master Production Schedule (MPS). In this system, Pagh and Cooper (2012) indicate that a planner plays a very important role in a chain. This planner regularly collects demand data by using communication network with market, and it periodically updates the MPS by using accumulated demand forecasting data. The main function of the planner is to give operational orders

periodically to supply chain members. The schedule-driven supplier regularly works with the planner as defined in the following operational sequence.

a) Planner receives purchase orders from consumers.
b) Planner analyzes accumulated demand data, and develops demand forecasts.
c) Planner generates Master Production Schedule (MPS), and provides manufacturing orders to each supplier by using MPS.
d) Supplier works according to the received order. When it finishes a work, it sends signal to the Planner.

ii. Stock-Driven Control:

This method is based on suppliers' stock volume information. Different from Schedule-driven control, the supplier gives an order to itself by using material stock information at its downstream supplier. Stassen and Waller (2002) suggests that the "Stock-driven" supplier always observes a particular stock volume, and it autonomously starts working when the stock volume falls below the predefined replenishment point. This type of supplier generally works according to the following operational sequences.

a) Supplier periodically observes volume of particular stock that it supplies.
b) Supplier starts to work as the stock volume goes below the pre-defined replenishment point.
c) Supplier has a commitment with Planner on the replenishment point. The Planner occasionally changes this volume based on demand trends information in comparatively long terms.

3.7.5 Activity View

The third modelling view is Activity. This view looks at the supply chain as composed of activities at each member organization. This idea is supported by Galtorna (2002) whereby in his own opinion, supply chain operations include many activities, however only core activities need to be included in supply chain simulation model. They suggest core activities to be classified into seven groups as follows:

i. Planning activities: These include planning activities for manufacturing, procurement, purchasing, and shipping. The operations are usually planned in accordance with demand data such as customers' order records. (Planner, Consumer)

ii. Manufacturing activities: These include activities for machining, assembling, disassembling in each supplier, and recording of these activities. (Supplier)

iii. Transportation activities: These include activities for packaging, shipping, carrying, receiving of materials to be transported. (Deliverer)

iv. Storing operations activities: These include all of the warehousing activities, such as packaging, storing, picking of materials to be stored. (Storage)

v. Material management activities: These include inspections, and waiting in a queue. They also include inventory management (Source, Supplier, Deliverer, Storage)

vi. Communication activities: storing, sharing, sending and receiving data that is exchanged among all of these organizations. (All)

3.7.6 Communication View

The final modelling view is Communication. Pagh and Cooper (2012) and Galtorna (2002) have the same opinion which indicates that each supply chain member is activated by communication with another chain member. The communication would be a driving force for sharing information and exchanging data among member companies. The collaboration among chain members is activated through such information sharing and data exchanges. The most important item is to share not only raw market demand data but also processed data that are useful to manage the supply chain system. Supply chain systems usually own a special member (Planner), which plays a central role in communication among chain members. The planner produces processed data and information, which are needed to manage all over the chain. These major data items are used for planning and control in both production and inventory management activities.

Galtorna (2002) classifies the communication data as follows.

i. Demand Forecast Data: The planner aggregates demand in each marketing channel in the chain. These are demand trends of finished goods in both the long and medium-term periods. In this process, miscellaneous data communications are derived. This data is used to generate MPS (Master Production Schedule).

ii. Production Planning Data: The planner generates the MPS including the production plans at individual suppliers. The processes of this phase are broken down into two types: one is planning and scheduling of operations such as assembly, ordering of component parts; and the other is generated based on the finished goods inventory level.

iii. Production Control Data: Suppliers control manufacturing operations and transportation operations by using detail schedules that are broken down from production planning data. This control data is given back to the planner as the activity-logs.

iv. Inventory Planning Data: Planner and suppliers make plans of locations and volumes of inventories to be stored. This inventory includes raw materials, intermediate products, and finished goods.

v. Inventory Control Data: Suppliers control inventories to be kept on the predefined level by way of inventory planning. This control data is given back to the planner as the activity-logs.

Stassen and Waller (2002) believe these data should be maintained at a central server and accessible by all the members of the supply chain. The data may be mirrored in systems at each individual member company. Also, individual member companies in general may share only the data on incoming material and planned shipments of products and not the detailed scheduling plans within their facility. One company may be a member of multiple supply chains and this would restrict the data they can share with other members of the supply chains in which they participate. Sometimes, unavailability of end customer demand data may force the upstream members of the supply chain to develop their own forecasts to supplement the order information from downstream members. The robust information system would be needed.

Connection of schedule-driven members results in a supply chain operating as a push system. The planner plays a very important role in this system. A very supportive idea by Brewer and Hensher (2001) highlights that the planner gets purchase orders from consumers and accumulates past order data to predict demands in the future. It further generates production orders and communicates them to individual chain members. The planner needs to collect various kinds of data from the chain members so as to give proper orders to each member. This configuration results in concentration of data and information with the planner, and the success of the supply chain is dependent on the decision-making capability of the planner.

Table 3.2 represents a configuration example of a schedule-driven supply chain system. In this system, a planner of the chain receives purchase orders from consumers and it gives production orders to each chain member. Every supplier produces products according to orders given by the supply chain planner. A particular member might receive orders directly from other chain members as is shown in the deliverer in this case.

Table 3.2: Modelling Base-Frame

Organization View	Control View	Relevant Activity View
Supplier	Stock- Driven	Supplier observes material stocks of an item in a particular supplier. The observation target is usually a stock of input materials at an immediate downstream supplier. When the stock volume is below the replenishment point, supplier autonomously starts to work to replenish the target part / product inventories.
	Schedule -Driven	Supplier receives production orders from Planner, which generates a Master Production Schedule (MPS). It executes the order, when it receives production orders from the Planner.
Source	Stock- Driven	Source observes material stocks of an item in a particular supplier. The observation target is usually a stock of input materials at an immediate downstream supplier. When the stock volume is below the replenishment point, source autonomously starts to work to replenish the target part / product inventories.
	Schedule- Driven	Source receives material orders from the Planner, which generates a Master Production Schedule (MPS). It executes the procurement orders per the schedule received from the Planner.
Storage	Stock- Driven	Storage receives materials from other chain members to hold them, and it autonomously ships materials to replenish stock inventories at particular suppliers.
	Schedule- Driven	Storage receives materials from other chain members to hold them, and it ships materials when it receives delivery orders from a planner.
Planner	Order Generation	Planner receives orders from Consumers, and sends delivery orders to deliverer. Planner stores the order as a demand-log. It predicts products demand in next phase and generates Master Production Schedule (MPS). This MPS is updated by orders that are given by the Consumer. The functions of this organization include: master scheduling, receiving orders from Consumer, forecasting demands, making commitments on replenishment with stock-driven members and sending orders to chain members. For stock driven stages in the supply chain, the role of the planner is to set the replenishment points and change them as required over time due to changes in market and demand.
Deliverer		It receives delivery order from other chain members, and it works according to the delivery order. The sender of this order is the upstream supplier of this deliverer.
Consumer		It gives products purchase orders to a planner. Also inspects the incoming products for quality and tracking.

Source: LaLonde (2000)

3.8 Limitations of Models

Even when used as a template or for instruction, William et.al. (2013), advises that models have limitations which reduce their reliability. There are some improper assumptions that conceptual models have no high integrity because they are just imaginations that conform to the rigorous standards of logic inherent in real world. Nonetheless, conceptual models must begin with precise assumptions about the specific activity. In great measure, the conclusions and insights offered by the model are restricted or even determined by the

initial assumptions. Therefore,, if the initial assumptions are wrong or misleading, or even if they are incomplete, despite the logical integrity of the model, the model's conclusions will be as much in error as the initial assumptions. A model can be logically consistent internally, and still yield bad results.

According to Vickery, Calantone and Droge (2011), the theories of public policy, assume that elected officials are motivated to act on behalf of the interests of their constituency, performing a public duty. Other economists might assume that the same officials act on behalf of their own self interest, formulating policy merely for the purpose of maximizing votes in an election, even if it is to the ultimate detriment of the voters. The former model might specify an objective function that is socially optimal (a mathematical equation that optimizes net social satisfaction, benefit, or gain), whereas the latter might specify an objective function which maximizes some measure of the individual political personal gain. The contrary results from such different beginnings are hardly surprising. The first model will tend to promote the idea that interventionist government policy is advisable if not indispensable. The second will, in contrast, suggest that intervention is corruptly expedient and counter-productive. William et.al, (2013) however, concludes that the kind of Model that would be right depends much upon the validity of the assumptions.

3.8 Conclusions

It is worthwhile to point out that when describing the economic or business operations or activity of consumers in general or even certain types of business decisions the theory of adaptive expectations is probably the most suitable. Rational expectation implies a degree of business management or economic knowledge and sophistication among ordinary citizens that they probably don't have. The models developed by business managers or economists seem to imply that most people think the same way as they do whereas the fact is that they probably don't. When describing an environment, however, where the decision-makers are likely to be sophisticated and well-informed and where their decisions involve high stakes, the models of rational expectations are more suitable. The choice of the theory of expectations, therefore, depends upon context. Models (conceptual, economic, statistical or mathematical) incorporating both theories and practical experience should be developed and used.

Different scholars sometimes have the mistaken impression that the models found in textbooks are devices that are directly used by people making decisions, such as managers of a business firm. They further think they are learning an algorithm or a tool that can be directly applied to a management decision. Economic models for instance are almost never used directly in this way. These models are not applied models as they are meant to represent a type of consistent economic behaviour either visually or mathematically.

They provide just a picture or imaginably world of that behaviour. Typically, in a market economy economic decisions and alterations to those decisions, are determined by market incentives, a series of rewards or penalties that alter behaviour in a way that it is forced to loosely conform to conditions described by the model. Models that identify market equilibrium are not used by business managers to set price and quantity but instead represent the theory that rational market incentives will force the market to eventually move to the equilibrium.

Development of the SCMM is the most significant contribution to the delivery of quality goods and services especially quality coffee from Kagera Region. Evolving from the economic theory of vertical integration in the operational theory of product life cycle, SCMM has been a major source of competitive advantage in the global economy. By minimizing the economic costs of production, processing and delivery and maximizing customer service across these stages of production through distribution, SCM activities have squeezed costs and redefined the competitive edge in many industries. More directly, supply chain efficiency is increasingly the basis for competitive survival. This study will develop a specific Conceptual coffee SCMM for Kagera in order to support coffee quality and quantity production in this Region.

Business Models such as SCMMs are widely used because they allow the analyst to simplify a situation according to the situation on ground. A real economy is a virtual porridge of interaction and data. To make some sense of this recondite chaos, the planner or manager will pull out those key variables which seem to have the most importance and fit only them into a true management model, omitting the others. Likewise, composites of individual human economic behaviour are aggregated in macroeconomic models, and as such are simplified. A rational consumption function with all of its arguments such as consumption depends upon income, wealth, expected income, the rate of inflation, and wealth. Some examples which makes the useful simplifying assumption that individual consumers are fairly consistent and similar in their economic behaviour, allowing for a generalization of the aggregate behaviour. Such simplifications are not only expedient but necessary. Nonetheless, the model in its simplicity is different than the real economy (or segment of the real economy) that it is designed to replicate. Likewise some generalizations end up being too crude to produce precise or accurate results.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

Chapter Three presented a comprehensive discussion about model development specifically in search for the appropriate conceptual model apply to address coffee SCM challenges facing Kagera region in Tanzania. The chapter discussed the reasons and advantage of application of conceptual models. At length, it highlighted the rationale for selecting a particular criterion for evaluating the conceptual models. Furthermore, the chapter presented various definitions of models, and the approach adopted in developing various models. Therefore, the chapter was about theory and practice of models generically as an application and extension of model variables for creation of the basis of discussing the conceptual SCMMs.

This chapter is identifies the definition of research, different research methods and their respective instruments for undertaking this study. The theoretical and practical review explains a typical research process, showing the types of research methods and research designs. Typical sampling, sampling techniques and data collection techniques are presented in detail. Furthermore, research method(s) for this study are described and instruments used are also explained (questionnaire, interviews, documentary sources and observation). Finally, it highlights how the collected data will be processed and analysed. It also explains the design of data gathering, presenting as well units of inquiry (institutions that will be involved in the research work) and their location in the country (the site of the study). It chapter finally describes the details of the sampling technique to obtain sample size of the study together with types of data to be collected during the fieldwork.

4.2 Definition of Research

Kothari (2004) defines research as a creative work undertaken to enhance the stock of knowledge, including knowledge of humanity, culture and society, and this stock of knowledge is used to devise new applications. This stock is further used to establish or confirm facts, reaffirm the results of previous work, solve new or existing problems, support theorems, or develop new theories. A research project may also be an expansion on past work in the field. To test the validity of instruments, procedures, or experiments, research may replicate elements of prior projects, or a whole project. The primary purposes of research are documentation, discovery, interpretation or the investigation of methods and systems for the advancement of human knowledge

Adam and Kamuzora (2008),Kothari (2004), Longman Dictionary of Contemporary English (2007), Ghauri and Grønhaug (2005), and The Institute of Finance Management (2012) view research as having a common interaction that: Research describes " any gathering of data, information and facts for the advancement of knowledge." or “an art of scientific investigation and a careful investigation or inquiry specially through search for new facts in any branch of knowledge thus a systematized efforts to gain new knowledge.”

The Merriam-Webster Dictionary (2013) also considers research as: "----a studious inquiry or examination; especially: investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws"

Therefore, the above clearly means that research is inquisitiveness, the mother of all knowledge and a method many researchers employ to obtain more knowledge about a particular problem. In the context of this study, research is an organized, systematic, data or fact collection based scientific or social inquiry or investigation into a specific problem, undertaken with an objective of finding explanations, answers or solutions to it.

4.3 Research Paradigm and Philosophy

Research paradigm and philosophy is an area that provides a descriptive analysis of the nature of positivism and post-positivist thinking in relation to research methodology and identifies the main elements of both approaches. It also explores the deduction and induction reasoning as well as ethical issues in research (Kothari, 2004). It indicates that positivism adopts a clear quantitative approach to investigating phenomena as opposed to post-positivist approaches, which aim to describe and explore in depth phenomena from a qualitative perspective. Although quantitative and qualitative research methods are often seen as opposing and polarized views, they are frequently used in conjunction with one another. According to different scholars (e.g.,) the distinction between the philosophies is overstated and triangulation of methods has been emphasized as common in current research approaches. Therefore, this section aims to provide a critical analysis with a view to developing an understanding of the strengths and weaknesses of each approach. A descriptive analysis of the philosophies of positivism and post-positivist thinking as well as deductive and induction reasoning in relation to research methodology are presented as

an introduction to the philosophical basis of research, and as a sound basis from which to discuss the 'quantitative-qualitative' debate.

Research paradigm and philosophy are important part of research methodology used to collect data in an effective and appropriate manner. According to Johnson and Christensen, (2010), research paradigm is a perspective based on the set of shared assumptions, values, concepts and practices. In other words, paradigm can be defined as a function of how researcher thinks about the development of knowledge. Research paradigm is a combination of two ideas that are related to the nature of world and the function of researcher. It helps researcher to conduct the study in an effective manner. Research paradigm includes the research methods and research philosophies. This combination in research helps researcher to develop the understanding and knowledge research the research topic. In research paradigm, there are various factors that affect the research such as time and budget constraints. The use of appropriate research paradigm and philosophies can help a researcher eliminate these constraints.

4.3.1 Research Philosophies

Research paradigm has three different branches namely positivism, interpretivism and realism research philosophies (Sekaran, (2006).

i. Positivist Philosophy

The positivist philosophy is based on the highly structured methodology to enable generalization and quantifiable observations and to evaluate the result with the help of statistical methods. Positivism philosophy is commonly used in natural science and it is a critical and objective base method. Saunders (2013) also supports the idea that it is an approach that includes various philosophies of natural science such as philosophy of unchanging, universal law and the view of everything that occurs in the nature. With the support of positivism philosophy, researcher can collect all the facts and figures that are associated with the research issue through general sources. According to Saunders (2013), in the positivist philosophy the researcher plays the role of an objective analyst to evaluate the collected data and produces an appropriate result in order to achieve research aims and objectives.

ii. Interpretive Philosophy

The interpretive philosophy believes that the social world of management and business is too complex as to be formulated in theories and laws such as in the natural science. Interpretive philosophy represents the critical thinking about positivism philosophy. According to this philosophy, there are many truths and

meanings that are suitable for every situation and for every research problem (Johnson and Christensen, 2010). This research philosophy plays an important role in order to produce end result from the collected data. With regard to research philosophy, the researcher does not only interact with environment, but also seeks to make sense of it through their interpretation of events and the meaning that they draw from these. Arguably, there are several factors such as an individual having different living standards, difference in social and cultural environment, personality and family groups etc. affects the nature of individual (Saunders, 2013).

iii. Realism Philosophy

The realism philosophy is also an important philosophy that is based on the interdependency of human values and beliefs. It focuses on the belief that really exists in the environment. It believes in the existence of external and objective reality that influences people's social interpretations and behaviour. It also believes that the human beings are not the objects of the study in the style of natural science. It defines how individuals react towards a real world situation (Johnson and Christensen, 2010).

iv. Objectivism and Subjectivism in Natural Sciences

Objectivism and subjectivism have been described as a continuum with varying philosophical positions aligned between them. The objectivist approach to social research developed from the natural sciences – social science researchers decided to employ the highly successful methods of the natural sciences to investigate social science phenomena. However, subjectivism arose as critics argued, and continue to argue, that both sciences are disparate. Objectivism and subjectivism have been viewed differently. For example, Easterby-Smith et al. (2007) named them as positivism and phenomenology while Hughes (2007) described them as positivism and interpretive alternative.

Figure 4.1: Analysis of Objectivism and subjectivism of the Nature of Social Science

Source: Hughes (2014)

Figure 4.1 depicts the two major philosophical traditions, their respective assumptions, and the terminology associated with them. Ontology relates to the nature of reality, that is, what things, if any, have existence or whether reality is the product of one's mind (Letourneau and Allen, 2009). In their view, reality is the corner stone to all other assumptions, that is, what is assumed here predicates the researcher's assumptions. The second assumption, epistemology concerns the study of the nature of knowledge. That is how it is possible, if it is, for human beings to gain knowledge of the world (Letourneau and Allen, 2009). It is concerned with the nature, validity, and limits of inquiry (Cook, 2005). Much of the research that has been completed in organisational science has been based on the assumption that reality is objective out there waiting to be discovered and that this knowledge can be identified and communicated to others. The third assumption, concerning human nature, involves whether or not the researcher perceives man as the controller or as the controlled (Cook, 2005). The final assumption is that methodology is the researcher's tool-kit as it represents all the means available to social scientists to investigate phenomena.

4.3.2 The Philosophy of Understanding

There are numerous reasons why an understanding of philosophical issues is important. Hughes, (2014) asks: "…what is it about philosophy that gives it this seemingly vital role in human intellectual affairs? Is this simply a contingent fact of our intellectual history, or is there something distinctive about philosophy itself which gives it this authoritative place?" To answer this question, it could be argued that it is the nature of philosophical questions that best demonstrates the value of understanding philosophy. Smith (2008) makes a point that it is the uncomplicated style and innocent way of questioningthat produces confusion and instability in the assumptions and ideas about the world that makes the study of philosophy of special

benefit. The indirectness and circular nature of philosophical questioning in itself is helpful, as it often encourages in-depth thinking, and generates further questions in relation to the topic under consideration.

Clarifying the assumptions related to personal values is also seen as useful when planning a research study. Proctor, (2008) observes that individuals rarely take time to do this in everyday life. Exploring basic personal beliefs could assist in understanding wider philosophical issues, notably 'the interrelationship between ontological (what is the nature of reality?), epistemological (what can be known?), and methodological (how can a researcher discover what she or he believes can be known?) levels of enquiry' (Proctor, 2008). Smith (2008) identifies three reasons why the exploration of philosophy may be significant with particular reference to research methodology. Firstly, it can help the researcher refine and specify the research methods to be used in a study, that is, to clarify the overall research strategy to be used. This would include the type of evidence gathered and its origin, the way in which such evidence is interpreted, and how it helps to answer the research questions posed. Secondly, knowledge of research philosophy will enable and assist the researcher to evaluate different methodologies and methods and avoid inappropriate use and unnecessary work by identifying the limitations of particular approaches at an early stage. Thirdly, it may help the researcher be creative and innovative in either selection or adaptation of methods that were previously outside his or her experience.

The ongoing 'quantitative versus qualitative' research debate is due to lack of coherent definitions and the focus on methods rather than an exploration of underlying philosophy. According to Clarke (2008), research methods can be described, considered and classified at different levels, the most basic of which is the philosophical level. Hughes (2014)comments that the methodological distinctions most commonly used focus on the difference between quantitative research, which is generally associated with the philosophical traditions of positivism and qualitative research, most commonly allied with the post-positivist philosophy. The philosophical level of a research method relates to its assumptions based on the most general features of the world, encompassing such aspects as the mind, matter, reality, reason, truth, nature of knowledge, and proofs for knowledge (Hughes, 2014). If we, for example, examine how research based on a positivist philosophy differs from that based on a post-positivist philosophy, the appropriateness to the research needs is simplified and the nature of the most appropriate approach clarified. From this we can see that the choice of approach may be dependent on the context of the study and the nature of the questions being asked. The researcher's experience, understanding of philosophy and personal beliefs may also have some bearing on the method adopted (Easterby-Smith et al. 2007)). Clarke (2008) expands this idea and lists four areas for consideration when deciding on a research method: the philosophical paradigm and goal

of the research, the nature of the phenomenon of interest, the level and nature of the research questions, and practical considerations related to the research environment and the efficient use of resources. Proctor (2008) considers that consistency between the aim of a research study, the research questions, the chosen methods, and the personal philosophy of the researcher is the essential underpinning and rationale for any research project. She indicates that before any decision on research method can be made an understanding of the two extremes of research philosophy, that is, positivism and post-positivism need to be explored and understood.

It is important to note that while quantitative research methods (or positivist philosophies) and qualitative methods (or post-positivist philosophies) are often seen as opposing views, they are frequently used in conjunction. The distinction between the philosophies is overstated (Webb, 2009) and triangulation of methods in current day research is common (Hughes, 2014). It is very important, therefore, that an in-depth understanding of the strengths and weaknesses of both approaches and their underlying philosophy is obtained. Clarke (2008) emphasises this point that though some distinction between methods is well placed, it is being acknowledged that philosophically the qualitative and quantitative paradigms are not as diverse or mutually incompatible as often conveyed. He indicates that identification of methods with particular paradigms may not be as accurate, or even as useful, an endeavour as past trends would indicate.

4.3.3 The Nature of Positivism

Positivist philosophy is in most cases described as the traditional scientific approach to research. From the literature positivism can be defined in various ways. Smith (2008) provides a useful insight into positivist thinking within social sciences with this description: "positivist approaches to the social sciences assume things can be studied as hard facts and the relationship between these facts can be established as scientific laws" (p.?). For positivists, such laws have the status of truth and social objects can be studied in much the same way as natural objects. The ideas associated with positivism have been developed and challenged, stated, re-examined and re-stated over time. Outhwaite (2007) suggests that there are three distinct generations of positivist philosophy. These generations follow from the period generally known as the 'enlightenment', which allowed the contemplation of social life to break away from religious interpretations and establish human beings as the main protagonists in the development and accumulation of scientific knowledge. The first generation produced philosophers such as Krishnaswami (2013) who were associated with the early traditions of positivism established in the 18th and 19th centuries. The next

generation was logical positivism, associated with philosophers of the early 20th century collectively known as the Vienna Circle Kumar (2005).

Bond, (2009) distinguishes between epistemology and methodology. The term epistemology comes from the Greek word epistêmê, meaning knowledge. In simple terms, epistemology is the philosophy of knowledge or of how we come to know. Methodology is also concerned with how we come to know, but is much more practical in nature. Methodology is focused on the specific ways the methods that we can use to try to understand our world better. Kumar (2005) belives epistemology and methodology are intimately related: the former involves the philosophy of how we come to know the world and the latter involves the practice.

When most people in our society think about science, Cook (2005) suggests that they think about some people in a white lab coat working at a lab bench mixing up chemicals. They think of the scientist as narrow-minded and esoteric (the ultimate end - think of the humorous but nonetheless mad scientist in the Back to the Future movies, for instance). A lot of our stereotypes about science come from a period where science was dominated by a particular philosophy-positivism- that tended to support some of these views. Here, I want to suggest (no matter what the movie industry may think) that science has moved on in its thinking into an era of post-positivism where many of those stereotypes of the scientist no longer hold up.

Considering what is positivism, Cook (2005) suggests that positivism is a rejection of metaphysics. It is a position that holds the goal of knowledge that describes the phenomena we experience. The purpose of science is simply to stick to what we can observe and measure. Knowledge of anything beyond that a positivist would hold is impossible. When positivism (and the related philosophy of logical positivism) is discussed the behaviourists in mid-20th Century psychology are not left out. These were the mythical rat runners who believed that psychology could only study what could be directly observed and measured. Since we can't directly observe emotions, thoughts, etc. (although we may be able to measure some of the physical and physiological accompaniments), these were not legitimate topics for a scientific psychology. Cook (2005) argues that psychology needed to concentrate only on the positive and negative reinforcers of behaviour in order to predict how people will behave and everything else in between (like what the person is thinking) is irrelevant because it cannot be measured.

In a positivist view of the world, Hemple (2005) suggests that science was seen as the way to get at truth, to understand the world well enough so that we might predict and control it. The world and the universe were deterministic as they operated by laws of cause and effect that we could discern if we applied the unique approach of the scientific method. Science was largely a mechanistic or mechanical affair. We use deductive reasoning to postulate theories that we can test. Based on the results of our studies, we may learn that our theory doesn't fit the facts well and so we need to revise our theory to better predict reality. Therefore,, Hemple (2005) maintains that positivist believed in empiricism which is the idea that observation and measurement was the core of the scientific endeavour. The key approach of the scientific method is the experiment, the attempt to discern natural laws through direct manipulation and observation.

One of the most common forms of post-positivism is a philosophy called critical realism (Popper, 2009; Philips, 2010). They feel that a critical realist believes that there is a reality independent of our thinking about it that science can study. This is in contrast with a subjectivist who would hold that there is no external reality -- we're each making this all up. According to them, positivists were also realists. The difference is that the post-positivist critical realist recognizes that all observation is fallible and has error and that all theory is revisable. In other words, the critical realist is critical of our ability to know reality with certainty. Where the positivist believed that the goal of science was to uncover the truth, the post-positivist critical realist believes that the goal of science is to hold steadfastly to the goal of getting it right about reality, even though we can never achieve that goal. Because all measurement is fallible, the post-positivist emphasizes the importance of multiple measures and observations, each of which may possess different types of error, and the need to use triangulation across these multiple sources full of errors to try to get a better bead on what's happening in reality. Popper (2009) asserts that the post-positivist also believes that all observations are theory-laden and that scientists are inherently biased by their cultural experiences, world views, and so on. That is, post-positivism rejects the relativist idea of the incommensurability of different perspectives, the idea that can never understand each other because others come from different experiences and cultures. Most post-positivists are constructivists who believe that others can construct their view of the world based on their perceptions of it. Philips (2010) believes that because perception and observation is fallible, our constructions must be imperfect. Then what does it mean by objectivity in a post-positivist world? Positivists believe that objectivity is a characteristic that resides in the individual scientist. Both Popper, (2009) and Philips (2010) conclude that the theories that survive such intense scrutiny are a bit like the species that survive in the evolutionary struggle. This is sometimes called the natural selection theory of knowledge and holds that ideas have 'survival value' and that knowledge evolves

through a process of variation, selection and retention. They have adaptive value and are probably as close as our species can come to being objective and understanding reality.

The basic reasoning of positivism assumes that an objective reality exists which is independent of human behaviour and is therefore not a creation of the human mind. Hughes (2014) suggests that all real knowledge should be derived from human observation of objective reality. The senses are used to accumulate data that are objective, discernible and measurable; any other thing should be rejected as transcendental. The positivists' antipathy to metaphysics within scientific enquiry is well illustrated by Bond (2013) "If we take in our hand any volume of divinity or school metaphysics, for instance, let us ask, does it contain any abstract reasoning concerning quality or number? No. Does it contain any experimental reasoning concerning matter of fact and existence? No. Commit it then to the flames for it can contain nothing but sophistry and illusion" (Bond, 2013).

The importance of induction and verification and the establishment of laws, are stressed by logical positivists and in this respect differ from the earlier tradition of positivism. The stated aim of the logical positivists is to cleanse scientific knowledge of speculative and subjective viewpoints. It endeavours to do this by the use of mathematics and formal logic (as a branch of mathematics) to provide analytical statements about the observed world using the process of induction as a means of establishing generalisations and laws. Post Second World War standard positivists such as Hemple (2005) focused on the need for reasoning that moves from theoretical ideas, or a set of given premises, to a logical conclusion through deductive thinking. That is, through the mental process of developing specific predictions from general principles, and through research establishing whether or not the predictions are valid. The general elements of positivist philosophy have a number of implications for social research based on this approach. These implications, adapted from Bond (2013), Easterby-Smith et al (2007), and Hughes (2014) are:

- Methodological: all research should be quantitative and that only research which is quantitative can be the basis for valid generalisations and laws.
- Value-freedom: the choice of what to study and how to study it, should be determined by objective criteria rather than by human beliefs and interests.
- Causality: the aim should be to identify causal explanations and fundamental laws that explain human behaviour.
- Operationalisation: concepts need to be operationalised in a way that enables facts to be measured quantitatively
- Independence: the role of the researcher is independent of the subject under examination

- Reductionism: problems are better understood if they are reduced to the simplest possible elements.

A major criticism of the positivist approach is that it does not provide the means to examine human beings and their behaviours in an in-depth way. Bond (2013) questions the use of positivist and empirical approaches to the study of human behaviour, and suggests that it may be something about the 'nature of men' that makes the establishment of laws and ability to generalize impossible. Moccia (2008) states as follows:In physics, it is possible to formulate laws relating to the expansion of metal when heated. From such laws, the amount of expansion that will occur in particular circumstances can be predicted. However, when a man loses his job and becomes depressed, it does not mean that he will be depressed each time he loses his job, nor can we say that everyone who loses his job becomes depressed

Humans are not objects and are subject to many influences on behaviour, feelings, perceptions, and attitudes that positivists would reject as irrelevant and belonging to the realms of metaphysics. Critics of the positivist approach argue that it yields useful but limited data that only provide a superficial view of the phenomenon it investigates (Bond, 2013; Moccia, 2008).In view of the foregoing exposition, the positivist philosophy embraces a conception of truth in which verifiable statements concur with the ascertainable facts of reality. Truth is therefore not dependent on belief alone but on belief that can be verified through examination and observation of external reality. Speculation and assumptions related to knowledge based on the metaphysical are discarded. The exploration and examination of human behaviours such as feelings are beyond the scope of positivism. The elements and focus of positivism have a profound effect on those involved in social research, and on the continuing 'quantitative-qualitative' debate.

4.3.4 Post-positivism

According to Outhwaite (2007), the recognition by scholars that within the world of modern science the elementary justifications of positivism were no longer entirely defensible, a new philosophy emerged, that of post-positivism. Post-positivism provides an alternative to the traditions and foundations of positivism for conducting disciplined inquiry. For the post-positivist researcher, reality is not a rigid thing; instead it is a creation of those individuals involved in the research. Reality does not exist within a vacuum, rather its composition is influenced by its context and many constructions of reality are therefore possible (Hughes, 2014). Proctor (2008) suggests that among the various factors that influence reality construction, culture, gender, and cultural beliefs are the most significant. They recognize the intricate relationship between individual behaviour, attitudes, external structures, and socio-cultural issues. It follows then that objective reality as proposed by positivist philosophy can be seen as only one aspect or dimension of reality. In describing the nature of post-positivist philosophy, Doyal (2013) suggests that post-positivism is concerned

with establishing and searching for a 'warranted assertibility' that is evidence that is valid and sound proof for the existence of phenomena (Philips, 1990). This is in contrast to the positivist approach of making claims to absolute truth through the establishment of generalisation and laws. Popper (2009) questiones the positivist claims to truth and scientific knowledge through the process of induction. As Doyal (2013), a student and colleague of Popper, explains: 'Popper argued that certainty or even high probability in knowledge was an illusion because given the universal claims of scientific theories we can never prove them on the basis of our particular experiences. There may always be a potential observation or experiment that might demonstrate that what we had previously thought to be true was, in fact false (Doyal 2013).

However, for Popper (2009) falsification that is disproving of theories and laws was much more useful than verification. The ideas of 'truth' and 'evidence' are allied mainly to positivist philosophy. The debate which centres on verification and falsification fits well within the positivist view. However, there are lessons for the researcher adopting a post-positivist approach. Popper (2009) adises the researcher to be intentionally critical, to test ideas against the evidence to the limit and to avoid being dictatorial in research. Smith (2008) suggests that falsification is as much an attitude to research as a set of methodological procedures. While post-positivism continued to consider the metaphysical as being beyond the scope of science, it was increasingly accepted by post-positivists that although a real world driven by natural causes exists, it is impossible for humans to truly perceive it with their imperfect sensory and mental capacity. From a realist standpoint it is advocated that unobservable phenomena have existence and that they can be used to explain the functioning of observable phenomenon (Guba 2010, Schumacher and Gortner 2010). According to Letourneau and Allen (2009), post-positivist approaches 'give way' to both qualitative and quantitative methods. This is described as critical multiplism (Guba and Lincoln 2008). Critical implies that as in positivism, the need for rigour, precision, logical reasoning and attention to evidence is required, but unlike positivism, this is not confined to what can be physically observed. Multiplism refers to the fact that research can generally be approached from several perspectives. Multiple perspectives can be used to define research goals, to choose research questions, methods, and analyses, and to interpret results (Cook 2005).

The limitations of post-positivist approaches generally relate to the interactive and participatory nature of qualitative methods. Gortner (2010) suggests that this is the main weakness and is due to the proximity of the researcher to the investigation. Guba (2010), Schumacher and Gortner (2010) summarise the main criticisms as: 'Firstly, that qualitative research is merely an assembly of anecdote and personal

impressions, strongly subject to researcher bias; Secondly, it is argued that qualitative research lacks reproducibility – the research is so personal to the researcher that there is no guarantee that a different researcher would not come to radically different conclusions; and, finally, qualitative research is criticised for lacking generalisability'. In a nutshell, post-positivist approaches assume that reality is multiple, subjective, and mentally constructed by individuals. The use of flexible and multiple methods is desirable as a way of studying a small sample in depth over time that can establish warranted assertibility as opposed to absolute truth. The researcher interacts with those being researched, and findings are the outcome of this interactive process with a focus on meaning and understanding the situation or phenomenon under examination.

4.3.5 Deduction and Induction Reasoning

In logic, Cook (2005) and Clarke (2008) suggest that there are two broad methods of reasoning namely: deductive and inductive

i. Deductive Reasoning

Deductive reasoning works from the general to the specific. Sometimes this is informally called a top-down approach. It starts with thinking up a theory about this topic of interest then it is narrowed down into more specific hypotheses that can be tested. It is narrowed down even further when researchers collect observations to address the hypotheses. This ultimately leads them to be able to test the hypotheses with specific data that is a confirmation of the original theories as indicated on Figure 4.2.

ii. Inductive Reasoning

Inductive reasoning goes from specific observations to broader generalizations and theories. Informally, this is called "bottom up" approach. In inductive reasoning, the research works begin with specific observations and measures, begin to detect patterns and regularities, formulate some tentative hypotheses that can be explored, and finally end up developing some general conclusions or theories as reflected on Figure 4.2.

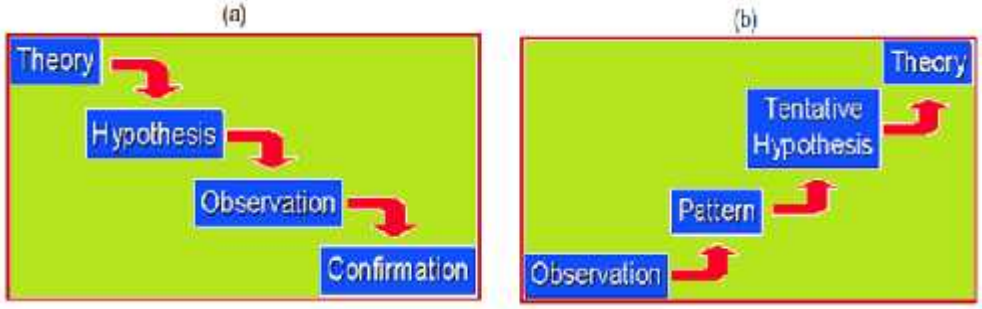

Figure 4.2: (a) Deductive Reasoning (b) Inductive Reasoning

Source: Cook, (2005)

According to Cook (2005) and Clarke (2008), these two methods of reasoning have a very different feel to them in conducting research. Inductive reasoning, by its very nature, is more open-ended and exploratory, especially at the beginning. Deductive reasoning is narrower in nature and is concerned with testing or confirming hypotheses. Even though a particular study may look like it's purely deductive (e.g., an experiment designed to test the hypothesized effects of some treatment on some outcome), most social research involves both inductive and deductive reasoning processes at some time in the project. In fact, it doesn't take a rocket scientist to see that we could assemble the two graphs above into a single circular one that continually cycles from theories down to observations and back up again to theories. Even in the most constrained experiment, the researchers may observe patterns in the data that lead them to develop new theories.

4.4 Ethical Issues in Research

There are a number of key phrases that describe the system of ethical protections that the contemporary social and medical research establishment have created to try to protect better the rights of their research participants. As recommended by Webb (2009), Denzin and Lincoln (2008), the principle of voluntary participation requires that people not be coerced into participating in research. This is especially relevant where researchers had previously relied on 'captive audiences' for their subjects like prisons and universities. Closely related to the notion of voluntary participation is the requirement of informed consent. Essentially, this means that prospective research participants must be fully informed about the procedures and risks involved in research and must give their consent to participate.

Ethical standards also require that researchers not put participants in a situation where they might be at risk of harm as a result of their participation. Harm can be defined as both physical and psychological.

Outhwaite (2007) supports the idea that almost all researches guarantee the participants confidentiality as they are assured that identifying information will not be made available to anyone who is not directly involved in the study. The stricter standard is the principle of anonymity which essentially means that the participant will remain anonymous throughout the study-even to the researchers themselves. Clearly, the anonymity standard is a stronger guarantee of privacy, but it is sometimes difficult to accomplish, especially in situations where participants have to be measured at multiple time points such as a pre-post study. Increasingly, researchers have had to deal with the ethical issue of a person's right to service. Good research practice often requires the use of a no-treatment control group-a group of participants who do not get the treatment or program that is being studied. But when that treatment or program may have beneficial effects, persons assigned to the no-treatment control may feel their rights to equal access to services are being curtailed.

Guba (2010) suggests that when clear ethical standards and principles exist, there are times when accurate research violates the rights of potential participants. No set of standards can possibly anticipate every ethical circumstance. Thus there needs to be a procedureto ensure that researchers will consider all relevant ethical issues in formulating research plans. To address such needs Webb (2009) advocates the system that has been developed by most institutions and organizations that have formulated an Institutional Review Board (IRB), a panel of persons who reviews grant proposals with respect to ethical implications and decides whether additional actions need to be taken to assure the safety and rights of participants. By reviewing proposals for research, IRBs also help to protect both the organization and the researcher against potential legal implications of neglecting to address important ethical issues of participants

4.5 Research Methods and Research Methodology

Kothari (2004) Adam and Kamuzora (2008) view research methods as the methods or techniques that are used in conducting research. In other words, the term refers to all techniques which are applied by the researchers during the course of studying various research problems. The authors categorise research methods into three major groups as follows:

i. Methods which are concerned with the collection of data (where the data available are not sufficient to arrive at the solution;
ii. Statistical techniques which are used for establishing relationships between the data and the research question; and
iii. Methods which are used to evaluate the accuracy of the results obtained out of the research work.

Kothari (2004) observes that research methodology is a multiple method or a guideline system which is applied in order to solve a problem with specific components such as phases, tasks, methods, techniques and tools. From this background, this study defines research methodology in three different ways as follows:

i. the analysis of the principles of methods, rules and postulates employed by a discipline;
ii. the systematic study of methods that are, can be, or have been applied within a discipline; and
iii. the study or description of methods always applied.

The Merriam-Webster Dictionary (2013) defines research methodology as a way to systematically solve a research problem. It adds that research methodology is the system of collecting data for research projects. As opposed to research methods, according to Kothari (2004), this is an area which describes how the research study is carried out. This argument cements the literature relating to the research philosophy, process, methods and procedures as presented by Ssegawa and Rwelamila (2009). As one can see, research methodology is where we learn the various steps that are employed by the researchers in studying research problem along with the logic behind them. Therefore, it is necessary for any researcher to know not only the research methods or techniques but also should understand research methodology as brand of knowledge. In nutshell, while research methods are just instruments in research work, methodology is a study of science for applying those instruments in undertaking research work. All this means that it is necessary for the researcher to design a methodology for a particular problem as the same may differ from one problem to another.

From what has been discussed above, Kothari (2004) further explains that it is clear now that research methodology has too many dimensions Thus, when we talk of research methodology, we do not only talk of research methods but also consider the logic behind the methods we use in the context of our research study and explain why we use a particular method or technique and why we do not use others so that research results are capable of being evaluated either by the researcher himself or by others. However, Adam and Kamuzora (2008) clarify that research methodology is an area which gives opportunity to the researcher to talk of why a research study has been undertaken, how the research problem has been defined, in what way and why the hypothesis has been formulated, what kind of data have been collected, what particular instruments and methods have been adopted, why specific technique of analyzing data has

been applied and answers to a host similar other questions. They hereby summarized that research methodology is a collective term for the structured process of conducting research.

Krishnaswami (2013) observe that research methodologies in the opinion by can be quantitative, qualitative or a combination of both of them. Ideally, comprehensive research methodology attempts to incorporate both qualitative and quantitative methodologies but this is not always possible, usually due to time and financial constraints. It is from this fact that research methodologies are used in academic research to test hypotheses or theories. A good research design should ensure that the research is valid, that is, it clearly tests the hypothesis and not extraneous variables, and that the research is reliable, that is, it yields consistent results every time. Part of the research methodology as we shall see, is concerned with how the research is conducted; that is research design.

4.6 Objectives of Research

The purpose of research according to Ghauri and Grønhaug (2005), Kothari (2005) as well as Adam and Kamuzora (2008) is to discover answers to questions through the application of scientific procedures. Cooper and Schindler (2009) concur with them and state that the main aim of research is to find out the truth which is hidden and has not been discovered yet. They further explain that although each research, be it scientific, humanity or artistic, the purpose and context differ considerably from one another. They finally point out that most of researchers basically agree that the most common and useful objectives[5] of research fall in the following groups:

4.1.1 Exploratory: a research carried out with intention of gaining familiarity with a certain phenomenon or to achieve new insights into it. This happens when a researcher knows little about the problem and hence aim at exploring it;

4.1.2 Descriptive: a kind of study conducted in order to portray accurately the characteristics of a particular individual, situation or a group of items. It is aims at describing a situation or a problem or giving a profile of the problem. Time series studies are good example of descriptive studies; and

4.1.3 Explanatory: a research undertaken so as to test hypothesis of a causal relationship between variables. It is a study which is conducted in order to establish cause and effect among variables. Thus,

[5] Research Objective refers to a statement in as precise terminology as possible of what the aim of the research information is. It tells exactly what the research aims at achieving at the end of the study

explanatory study goes beyond description and attempts to explain the reasons for the phenomenon that the descriptive study only observed (Cooper and Schindler, 2009).

4.7 Research Process

A research process consists of a series of actions or steps necessary to effectively carry out research work and the desired sequencing of these steps (White, 2012; Hellesøy,et al. 2012). In other words, they are a set of activities to be completed in the research process or a set of activities unfolding over time (Adam and Kamuzora, 2008; Ghauri and Grønhaug, 2005). However, a very important aspect to note from the very beginning is that there is no precise number of stages agreed by different scholars. According Krishnaswami (2013) and Kothari (2004), the research process usually includes development of research idea; identification of the research problem; defining and clarifying a problem; review of related literature or review of previous research findings concepts and theories; designing of the research including preparation of research tools; data collection; data processing and analyzing, interpreting of data; and writing of a research report. Figure 4.3 below depicts a graphical representation of the research process.

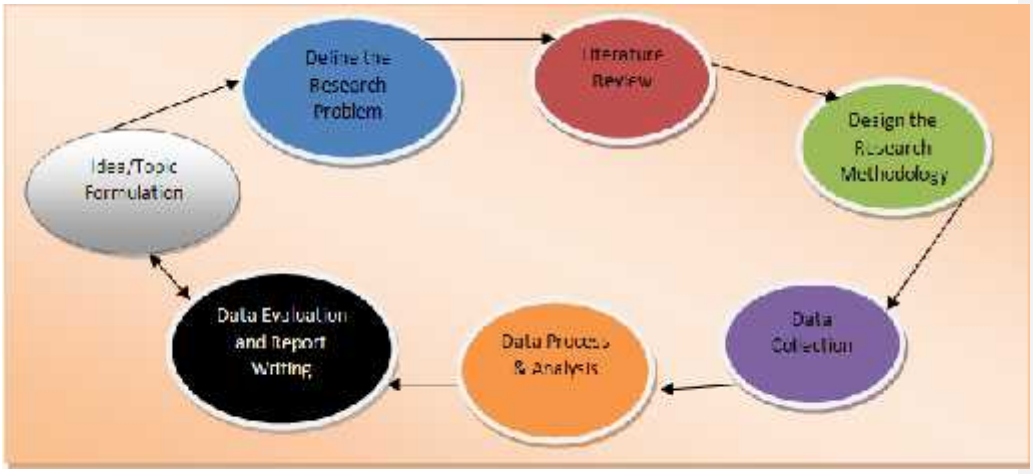

Figure 4.3: Research Process Activities

Source: Kothari (2004)

KEY : ⟷ Represents Feed back
→ Represents Flow of Activities

The starting point is the choice or formulation of research topic; that is the phenomenon or the theme to be studied. The relationship between research topic and research problem triggers review of the literature. Thus, when a researcher has established what he wants to know and how this relates to present insights

he reviews the literature, and has a clear research problem. This is a point of departure for further research activities as shown in Figure 4.3 above and as will be discussed in details below.

Hellesøy et al. (2012) suggest that the research process might not necessarily be straightforward; it may be forward and backward because it takes time and consideration such that it may be modified and or changed over time. Despite the fact that the suggested steps and their names sometimes differ from one another, there are more similarities than differences. It is further suggested that no scholar claims that there is truly linear research process, orderly moving from one step to another (Krishnaswami, 2013). Some steps may be in a different order while some steps may have to be retraced, others may be carried on simultaneously whereas some may be omitted. He illustrates problem identification and clarification with a literature review, designing and report writing stages. Therefore,, according to Ghauri and Grønhaug (2005), "a research process is not so orderly and sequential, but is rather messy. Researchers should not be surprised or worried when the process is not systematic and if in practice they have to go back and forth in the process all the time". He gives an example that at one stage during observation, a researcher may discover something that may necessitate a return to an earlier stage such as modifying the research problem or hypothesis. Thus, feedback loops between the stages are always common.

Ssegawa and Rwelamila (2009) proposes that understanding research process is the best way to come up with better research findings needed by the respective community. They argue that:

> In practical sense, understanding, preparation and presenting a research process is an aspect that demonstrates that the researcher has grasped the ontological and epistemological aspects of the research process and hence the underlying arguments which the study findings may be subjected to by the research community.

4.7.1 Research Idea

The common challenge facing researchers according to Ssegawa and Rwelamila (2009) is to formulate a plausible title or topic which is neither too short to be meaningless nor too long to be confusing. They argue that a researcher might have a particular interest in a certain topic. However, to make a topic researchable; it must be turned into a research question. Kothari (2004) proposes that 'it is compulsory for a researcher writing a thesis for a particular degree to write a synopsis of the topic and submit it to the necessary committee or the RB for approval. Ssegawa and Rwelamila (2009) observes that among others, a failure of a researcher to develop a credible and sound research topic leads to vague research definition and design such that exacerbates the problem of attrition and completion time of the desired study.

The common understanding among scholars is that the research process starts with what Blumberg et al. (2005) and Aaker et al. (2012) call research idea that leads to research dilemma or problem which is triggered by a researcher's inquisitiveness or investigation need. Under normal circumstances, a topic is first developed and construction of a research problem within that topic follows. Ghauri and Grønhaug (2005) suggest that in order to improve research idea as an input to research problems it is better to get feedback. This means that a research idea should be discussed with friends, colleagues, supervisors and other people who are interested hopefully they advise. They further suggest that once the researcher knows the topic it is good idea to review previous theses and journal articles on similar topic as most of this literature presents good ideas for future research in a particular research topic. Ssegawa and Rwelamila (2009) posit that it is generally accepted that the suitability test of the title lies in its brevity, meaning, scope and feasibility.

4.7.2 Research Problem

Kothari (2004) states that research problem is a question for which an answer has not been provided. Krishnaswami (2013) and Aaker et al. (2002) consider the term problem as a subject matter or an issue that has to be examined. They refer to it as some difficulty which a researcher experiences in the context of both a theoretical or practical situation and wishes to get a solution for. Napier (2010) and Saunders et al. (2007) have the opinion that a research problem can be anything that a researcher finds unsatisfactory, a difficulty of some sort, a state of affair that needs to be changed or modified, anything that is not working as it should or ought to. Berg (2014) notes that in defining a problem statement researchers should endeavour to formulate a statement that is carefully phrased to represent the research goals.

Ssegawa and Rwelamila (2009) and Berg (2014) propose eight main activities or formulations to constitute the phase of defining research problem namely:

i. Conceptualizing the research problem;
ii. Identifying the research subject area;
iii. Formulating a problem statement;
iv. Proposing research questions;
v. Formulating research objectives;
vi. Suggesting a set of research propositions or hypotheses;
vii. Setting research scope (setting boundaries of the study); and
viii. Identifying the rationale of the study.

4.7.3 Literature Review

Various scholars such as Green et al. (2006), Hart (2009), Boote and Beile (2005) define literature review using different statements but with the same meaning. Literature review is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic. According to them, literature reviews are secondary sources, and as such, do not report any new or original experimental work. A literature review can also be interpreted identifying existing gap. Most often associated with academic-oriented literature, such as a thesis, a literature review usually precedes a research proposal and results section. Its main goal is to situate the current study within the body of literature and to provide context for the particular reader.

According to Hart, (2008) a dissertation literature review contributes 40 % of total work load. Hence, more effort should be taken to collect exhaustive up to date literature that has been published from various countries or conducted among different ethnic groups. Moreover, it should be relevant literature, including empirical, historical, philosophical literatures related to the problem stated.

4.7.4 Research Design

Having formulated the research problem, the researcher is required to prepare a research design. Krishnaswami (2013) maintains that a good research design is essential for a successful research process. A researcher has to plan in advance the study area, the type of research to be carried out, methods of obtaining the required data, a sample from which data is to be collected, the type(s) of data to be collected, methods to use in collecting and analyzing data, and duration and adequate funds to complete the study. A research design will indicate a plan of how one is going to approach his research question and obtain the required answers. Thus, research design refers to the structure of an enquiry; it is a logical matter rather than a logistical one.

The methodology section of a research work according to Brownlee (2006) and Stanley (2013) is used to describe what the researcher will do (did) and how the study will be (was) conducted. One important purpose is to enable others to repeat the experiment and verify the results if they wish to. In so doing, it should summarize the procedures in the execution of each of the stage of the research work. This section should build on the description of methods outlined in the proposal. The researcher should label subsections similar to those in the proposal. It may include subsections describing participants or subjects,

another describing testing or a measurement procedure to be undertaken with the participants, and a section describing limitations of the methodology. In a nutshell, this section should present the procedures to be applied and the kind of design, type(s) of data, sources of data, methods of gathering data, sampling and sampling techniques and description of instruments used in gathering data as well as the way the data will be processed, analysed, interpreted and reported.

Kumar (2005) defines a research design as the conceptual structure within which research would be conducted. The function of research design is to provide for the collection of relevant information with minimal expenditure of effort, time and money. Aaker et al. (2012) defines a research design as the detailed blue print used to guide the research study towards its objectives. In view of this definition, a research design is a plan of work to be done in order to achieve the intended research objectives. Kothari (2004) and Ramachandran (2012) are suggesting different words but have the same opinion that research design consists of four major and specific issues namely methods and instruments of data collection, sample and sampling methods, data processing and analysis and data organization and reporting.

Likewise, Adèr et al. (2008) indicate that research design is a "blueprint" for research, dealing with four main aspects: which questions to study, which data are relevant, what data to collect, and how to analyze the results. It further indicates that the best design depends on the research question as well as the orientation of the researcher. In sociology according to Creswell (2012) and Campbell and Stanley (2013), there are three basic designs, which are considered to generate reliable data. These are cross-sectional, longitudinal and cross-sequential research designs. They are of the opinion that a research design can be divided into fixed and flexible research designs. They assert that others referred to this distinction as ‘quantitative research designs’ and ‘qualitative research designs,’ respectively. However, Adèr et al. (2008) assert that fixed designs need not be quantitative, and flexible design need not be qualitative. In fixed designs, the design of the study is fixed before the main stage of data collection takes place. Fixed designs are normally theory driven; otherwise it’s impossible to know in advance which variables need to be controlled and measured. Often, these variables are measured quantitatively. Flexible designs allow for more freedom during the data collection process. One reason for using a flexible research design can be that the variable of interest is not quantitatively measurable, such as culture altitude and behaviour. In other cases, theory might not be available before one starts the research.

Kothari (2004) observes that the preparation of research design which is appropriate for a particular research problem involves the consideration of the following:

i. objectives of the research study;

ii. methods of data collection to be adopted;
iii. sources of information—Sample Design;
iv. tools for data collection;
v. data analysis-- qualitative and quantitative;
vi. the availability and skills of the researcher and staff (if any);
vii. explanation of the way in which selected means of obtaining information will be organised
viii. and the reasoning leading to the selection;
ix. the time available for research; and
x. the cost factor relating to research, i.e., the finance available for the purpose.

Adam and Kamuzora (2008) advocate the need to have a clear and well defined research design in order to have an economical research project. They suggest the following main tasks:

i. determination of the required data;
ii. identify the sample frame;
iii. specifying the sample from which data to be obtained;
iv. stipulate the sampling procedure and sample size;
v. specifying appropriate data collection techniques and instruments;
vi. developing a plan for data processing and analysis;
vii. drawing up a budget estimates for the entire research project;
viii. propose the likely constraints to be encountered by the researcher; and
ix. Indicating ethical issues and the way to be managed.

This study concurs with De Vaus, (2011) that a research design is not just a work plan but it gives details of what has to be done to complete the project but the work plan will follow from the project's research design. The function of a research design is to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible. Thus a Research design 'deals with a logical problem and not a logistical problem'. Basically, the study is in accord that there are three main types of research designs namely Experimental, Survey and Case Study as hereby elaborated:

i. Experimental Design

Experimental design also known as empirical research or cause and effect method, is a data-based research, coming up with conclusions which are capable of being verified with observation or experiment. This is a kind of research that is appropriate when proof is sought that certain variables affect other variables in some way. Such research is characterised by the experimenter's control over the variables under study and the deliberate manipulation of one of them to study its effects. In such a research, it is necessary to get at facts first hand, at their source, and actively go about doing certain things to stimulate the production of desired information. According to De Vaus (2011), experimental research focuses on why questions. For example, it is one thing to describe the crime rate in a country, to examine trends over time or to compare the rates in different countries. It is quite a different thing to develop explanations about why the crime rate is as high as it is; why some types of crime are increasing or why the rate is higher in some countries than in others. In this kind of research design, the researcher must provide a working hypothesis or guess as to the probable results. He has to get enough facts (data) to prove or disapprove the hypothesis. He then sets up experimental designs which he thinks will manipulate the persons or the materials concerned so as to bring forth the desired information. Evidence gathered through experimental or empirical studies is considered to be the most powerful support possible for a given hypothesis.

Brownlee (2006) states that in an experimental design a researcher actively tries to change the situation, circumstances or experience of participants (manipulation), which may lead to a change in behaviour or outcomes for the participants of the study. The participants are randomly assigned to different conditions, and variables of interest are measured. The researcher tries to control the other variables in order to avoid confounds to causality. Therefore,, experiments are often highly fixed even before data collection. In a good experimental design it is necessary to think of the best way to operationalise the variables that will be measured (Hellesøy et al., 2012). Therefore, it is important to consider how the variable(s) will be measured, as well as which methods would be most appropriate to answer the research question. In addition, the statistical analysis has to be taken into account. Thus, the researcher should consider what the expectations of the study are as well as how to analyse the outcome. Finally in an experimental design, Brownlee (2006) suggests the researcher to ensure the availability of participants as well as how representative the participants are to the target population.

In general terms, Boote and Beile (2005) conclude that design of experiments (DOE) or experimental design is the approach of information-gathering exercise where variation is present, whether under the full

control of the experimenter or not. However, in statistics, this kind of design is usually used for pure scientific and controlled experiments and researches. Thus,an experimental research design is most appropriate in controlled settings such as laboratories. The design assumes random assignment of subjects and random assignment to groups. It attempts to explore cause and affect relationships where causes can be manipulated to produce different kinds of effects. Because of the requirement of random assignment, this design can be difficult to execute in the real world (non laboratory) setting.

ii. Survey Research Design

According to Boote and Beile (2005) survey research design was pioneered in the 1930s and 1940s by Lazarsfeld in sociological work. Initially, the method was used to examine the effects of the radio on political opinion formation of the United States. One of its early successes was the development of the theory of two-step flow of communication. The method was foundational for the inception of the quantitative research tradition in sociology. It further states that survey research involves utilizing interviews or questionnaires to obtain information in fields such as marketing, politics, and social science. Application of survey is considered to be an efficient way of collecting data from a large number of respondents, accurately representing a whole population. In addition, Survey provides data that is relatively free from errors.

Various academicians including Groves, et al. (2009), Babbie (2007) and Dillman (2008) define Survey research design as an information collection technique from a relatively large number of cases or units under investigation. In other words, it is the technique of data collection from a large number of people, groups where by relationships, is studied by gathering information on few variables. Survey design is also described by these scholars as a form of ex post facto research in which a researcher simply collects data about certain characteristics or variable from a sample of the large population units in natural settings.

According to Dillman (2008), survey research design is a technique of collecting information by asking questions (interview). Sometimes interviews are done face-to-face with people at home, in school, or at work. In some instances, questions are sent in the mail for respondents to answer and mail back the answers to researchers while sometimes surveys are conducted by telephone. In most instances, surveys capture attitude or patterns of past behaviour. Using different words and styles, Mellenbergh and Adèr (2008) are looking at Survey research as one of the most important areas of measurement in applied social research. They further see it as a broad area of survey research encompassing any measurement

procedures that involve asking questions to respondents. Thus, a survey can be anything that forms a short paper-and-pencil feedback form to an intensive one-on-one in-depth interview.

In this regard therefore, the term survey refers to one or some combination of two, procedure(s) namely questionnaires; and interviews. A questionnaire almost always is self-administered, allowing respondents to fill them in. All the researcher has to do is to arrange delivery and collection. There are two types of questionnaires known as close-ended and open-ended questionnaires. Dillman (2008) observes that an interview occurs whenever a researcher and respondent are face-to-face or communicating via some technology like telephone or computer. There are three sub-types of interviews: unstructured; which allows spontaneous communication in the course of the interview or questionnaire administration; structured, where the researcher is highly restricted on what to say be said; and semi structured, which restricts certain kinds of communication but allows freedom on discussion of certain topics.

Basically there are two categories of survey designs namely cross-sectional and longitudinal surveys:

i. Cross-Sectional Surveys: data are collected at one point in time from a sample selected to represent a larger population.
ii. Longitudinal Surveys:these are intensified in terms of trend, cohort, and panel; where:
    a) Trend refers to surveys of sample population at different points in time;
    b) Cohort is a study of same population each time data are collected although samples studied may be different; and
    c) Panel is a collection of data at various time points with the same sample of respondents.

Dillman (2008) identifies three different characteristics of survey research. First, survey research is used to quantitatively describe specific aspects of a given population. These aspects often involve examining the relationships among variables. Second, the data required for survey research are collected from people and are, therefore, subjective. Finally, survey research uses a selected portion (sample) of the population from which the findings can later be generalized back to the population.

i. Strengths of Survey Designs

Survey designs have the following strengths:

a) Relatively inexpensive (especially self-administered surveys);
b) Useful in describing the characteristics of a large population;
c) Can be administered from remote locations using mail, email or telephone;

d) Large samples are applied in order to make the results statistically significant;
e) Many questions can be asked thus giving considerable flexibility to the analysis;
f) There is flexibility at the creation phase in deciding how the questions will be administered: eg. face-to-face interviews, by telephone, mail or electronic means;
g) Standard questions are used so as to have uniform definitions to all respondents;
h) Standardization ensures that similar data can be collected from groups then interpreted; and
i) High reliability - all subjects face common stimulus and observer subjectivity is eliminated.

ii. Weaknesses of Survey Designs

Survey designs suffer the following weaknesses:

a) It relies on standardization that forces the researcher to develop general questions that may not be appropriate for all respondents, possibly missing what may be appropriate to many of them;
b) Are inflexible - they require the initial study design to remain the same during the data collection;
c) The researcher must ensure that a large number of the selected sample will reply; and
d) Respondents rarely recall information or tell the truth about a controversial question.

iii. Case Study Design

A case study design is among the widely recognised data collection approach in many social science studies especially when in-depth explanations of a social behaviour are sought after. Although case study methods remain a controversial approach to data collection, the advantages realised when it is employed presents bigger portion than its challenges. Therefore, a case study is an approach that enables a researcher to closely examine the data within a specific context Yin (2014). This method selects a small geographical area or a very limited number of individuals as the subjects of study. Case studies, in their true essence, explore and investigate contemporary real-life phenomenon through detailed contextual analysis of a limited number of events or conditions, and their relationships. Babbie (2007) defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used.

In a case study approach, one single unit is studied such as a case of a person, organization, group or situation. A number of authors including Adam and Kamuzora (2008) and Aaker et al. (2012) propose that a case study approach is particularly appropriate for individual researchers because it gives an opportunity

for one aspect of a problem to be studied in depth within a limited time scale. They see a case study as an intensive or comprehensive description and analysis of a single situation or unit of study. Explanation given out indicates that a case study is an in-depth, contextual analysis of a similar situation in other organisations where the nature and definition of the problem happen to be the same as experienced in the current situation.

A case study also known as a case report is viewed by Creswell (2012), Berg (2014) and Robson (2013) as an intensive analysis of an individual unit be it a person, group, or event stressing developmental factors in relation to context. In this regard, they add that case studies can be descriptive, exploratory or explanatory. They concur with other scholars that case study approach is applied to analyse persons, events, decisions, periods, projects, policies, institutions, or other systems that are studied holistically by one or more methods. Case or Field research design also called ethnographic research; it uses direct observation to give a complete snapshot of a case that is being studied. It is useful when not much is known about a phenomenon. Therefore, acase study design as compared to a survey design is a more detailed design as it involves a particular setting and focuses on only one unit or organisation alone. The findings are very unique to the specific organisation only (it cannot be generalised to other organisations). The study of a single case study cannot be a sample of other units or organisations. According to Napier (2010) and Babbie (2007), all methods of data collection can be applied in this research design, that is, interview, questionnaire, observation and public records or documentary sources.

i. Categories of Case Studies

Yin (2014) and Zaidah (2013) note three major categories of case studies, namely Exploratory, Descriptive and Explanatory case studies as follows:

a) Exploratory Case Studies: These are set to explore any phenomenon in the data which serve as a point of interest to the researcher. For instance, a researcher conducting an exploratory case study on an individual's reading process may ask general questions, such as, "Does a student use any strategies when he reads a text?" and "if so, how often?".

b) Descriptive Case Studies: They are set to describe the natural phenomena which occur within the data in question. For instance, what different strategies are used by a reader and how the reader uses them? The goal set by the researcher is to describe the data as they occur.

c) Explanatory Case Studies: Are designs that examine the data closely both at a surface and deep level in order to explain the phenomena in the data (Zaidah, 2013). For instance, a researcher may ask why a student uses an inferencing strategy in reading. On the basis of the data, the researcher may develop a theory and set to test this theory.

However, Stake (2005) distinguishes three types of case studies namely, the intrinsic,the instrumental, and the collective as follows:

a) In an intrinsic case study, a researcher examines the case for its own sake. For instance, why does student A with age eight, fail to read when most children at that age can already read?
b) In an instrumental case study, the researcher selects a small group of subjects in order to examine a certain pattern of behaviour. For instance, to see how tertiary level students study for examination; and
c) In a collective case study, the researcher coordinates data from several different sources, such as schools or individuals. Unlike intrinsic case studies which set to solve the specific problems of an individual case, instrumental and collective case studies may allow for the generalisation of findings to a bigger population.

ii. Advantages of Case Study Design

According to Yin (2014), Kothari (2004) and Zaidah (2013), there are a number of advantages in using case studies as discussed hereunder:

a) The examination of the data is most often conducted in its natural setting, that is, within the situation in which the activity takes place;
b) Variations in terms of intrinsic, instrumental and collective approaches to case studies allow for both quantitative and qualitative analyses of the data; and
c) The qualitative accounts often produced in case studies not only help to explore or describe the data in real-life environment, but also help to explain the complexities of real life situations
d) All methods of data collection can be applied in a case study design. That is, interview, questionnaire, observation and documentary sources give assurance of getting all required data.

iii. Disadvantages of Case Studies

Despite its advantages, case studies have received criticisms. Yin (2014), Zaidah, (2013) and Babbie (2007) discuss three types of arguments against case study research:

a) Lack of rigour. too many times, the case study investigators have been sloppy, and allowed equivocal evidence or biased views to influence the direction of the findings and conclusions;
b) It provides very little basis for scientific generalisation since they use a small number of subjects, whereas some are conducted with only one subject; and
c) It is often too long, difficult to conduct and producing a massive amount of documentation. The danger comes when the data are not managed and systematically organised.

Although case study methods remain a controversial approach to data collection, they are widely accepted in many social science studies especially when in-depth explanations of a social behaviour are sought (Babbie, 2007).

4.8 Sample and Sampling Techniques

When conducting research, it is almost always impossible to study the entire population that you are interested in. According to Adam and Kamuzora (2008), if, for example, a researcher is studying political views among college students in Tanzania, it would be nearly impossible to survey every single college student across the country as this is the largest country in East Africa. If you were to survey the entire population, it would be extremely difficult in terms of finance, energy and time. As a result, a researcher should use samples as a way to gather data and get the views.

i. A Sample: the Longman Dictionary of Contemporary English (2007) defines it as a subset of the population being studied. It represents the larger population and is used to draw inferences about that population. Stuart (2009) looks at a sample as a representative part or, in other words, according to himself, a single item from a larger whole or group especially when presented for inspection or shown as evidence of quality or a finite part of a statistical population whose properties are studied to gain information about the whole. He gives explanation that there are several different types and ways of choosing a sample from a population, from simple to complex. Formulas, tables, and power function charts are well known approaches to determine sample size.

ii. Sampling: Mellenbergh and Adèr (2008) define it as the process of the selection of a subset of individuals from within a large population to represent the whole population. Researchers rarely survey the entire population because the cost of a census is too high. The advantages of sampling are that the cost is lower, data collection is faster, and it is possible to ensure homogeneity and improve the accuracy and quality of the data. From the fact that Sampling is very vital in data collection, Stuart (2009) suggests that good data collection, among others, involves following the defined sampling process. He further proposes that Sampling methodologies are classified under two general categories namely probability[6] samplingand non-probability sampling as are elaborated as follows:

4.8.1 Probability Sampling

Mellenbergh and Adèr (2008), Stuart (1999) and Leedy (2013) define probability sampling as a scheme in which every unit in the population has a chance (greater than zero) of being selected in the sample, and this probability can be accurately determined. The combination of these traits makes it possible to produce unbiased estimates of population totals by weighing sampled units according to their probability of selection. Adam and Kamuzora (2008) consider it as a type of sampling where every member in the population has a probability or a chance of being selected to form a sample. There are different types of probability sampling namely simple random sampling, systematic sampling, stratified sampling and cluster or multistage sampling. Kothari (2004) observes that these various ways of probability sampling have two characteristics in common; every element has a known non-zero probability of being sampled and each involves random selection at some point.

i. Simple Random Sampling(SRS)

Krishnaswami (2013) and Leedy (2013)propose that in a simple random sample of a given size all subsets of the frame are given an equal probability of being selected to form a sample. Furthermore, any given pair of elements has the same chance of selection as any other such pair. This method minimises bias and simplifies the analysis of results. The variance between individual results within the sample is a good indicator of variance in the overall population, which makes it relatively easy to estimate the accuracy of results. However, SRS can be vulnerable to sampling error because the randomness of the selection may result in a sample that does not reflect the makeup of the population. For instance, a simple random

6 **Probability**: something that is likely to happen or exist, the state of being probable, or the extent to which something is probable or has a possibility to happen

sample of ten people from a given country will on average produce five men and five women, but any given trial is likely to over-represent one sex and under-represent the other. Systematic and stratified techniques, discussed in subsequent sections help overcome this problem by using information about the population to choose a more representative sample.

ii. Systematic Sampling

According to Hart (2011) and Robson (2013), systematic sampling involves selecting the sample at regular intervals from the sample frame.[7] It relies on arranging the target population[8] according to some ordering scheme and then selecting elements[9] at regular intervals (say every n^{th} element) through that ordered list. Systematic sampling involves a random start and then proceeds with the selection of every k^{th} element from then onwards. In this case, k= (population size/sample size). As long as the starting point is randomized, systematic sampling is a type of probability sampling that is easy to implement and the stratification induced can make it efficient, if the variable by which the list is ordered is correlated with the variable of interest. 'Every 10th' sampling is especially useful for efficient sampling from databases. However, systematic sampling is especially vulnerable to periodicities in the list. If periodicity is present and the period is a multiple or factor of the interval used, the sample is especially likely to be unrepresentative of the overall population, making the scheme less accurate than simple random sampling. Another drawback of systematic sampling is that even in scenarios where it is more accurate than SRS, its theoretical properties make it difficult to quantify that accuracy.

iii. Stratified Sampling

Babbie (2007), Krishnaswami (2013) and Leedy (2013) consider stratified random sampling a sampling technique whereby the total population is divided into different groups or layers (strata) before selection of the representatives. This is to ensure representation of all members of the population. Stratified sampling occurs where the population embraces a number of distinct categories; the frame can be organized by these categories into separate "strata." Each stratum is then sampled as an independent sub-population out of which individual elements can be randomly selected.

There are several potential benefits of stratified sampling. First, dividing the population into distinct, independent strata can enable researchers to draw inferences about specific subgroups that may be lost in

[7] **Sample Frame** is a complete list of all objects or elements in the population from which the sample is selected
[8] **Population** is the totality of objects under investigation
[9] **Elements** are persons, units or objects that in totality make up a population that a researcher is interested in

a more generalized random sample. Second, utilizing a stratified sampling method can lead to more efficient statistical estimates (provided that strata are selected based upon relevance to the criterion in question, instead of availability of the samples). Even if a stratified sampling approach does not lead to increased statistical efficiency, such a tactic will not result in less efficiency than would simple random sampling, provided that each stratum[10] is proportional to the group's size in the population. Third, it is sometimes the case that data are more readily available for individual, pre-existing strata within a population than for the overall population; in such cases, using a stratified sampling approach may be more convenient than aggregating data across groups (though this may potentially be at odds with the previously noted importance of utilizing criterion-relevant strata). Finally, since each stratum is treated as an independent population, different sampling approaches can be applied to different strata, potentially enabling researchers to use the approach best suited (or most cost-effective) for each identified subgroup within the population.

However, there are some drawbacks in using stratified sampling (cf. Babbie (2007). First, identifying strata and implementing such an approach can increase the cost and complexity of sample selection, as well as leading to increased complexity of population estimates. Second, when examining multiple criteria, stratifying variables may be related to some, but not to others, further complicating the design, and potentially reducing the helpfulness of the strata. Finally, in some cases stratified sampling can potentially require a larger sample than would other methods.

a) Advantages of Stratified Sampling

Advantages of applying stratified sampling over other sampling methods are:

i. It focuses on important subpopulations and ignores irrelevant ones.
ii. Allows use of different sampling techniques for different subpopulations.
iii. Improves the accuracy/efficiency of estimation.
iv. Permits greater balancing of statistical power of tests of differences between strata by sampling equal numbers from strata varying widely in size.

[10]Stratum is a layer or level within an ordered system. In other words, it is a social class or level of society consisting of people of similar cultural, economic, or educational status. In Geology, it is a layer of rock, normally sedimentary, that is generally homogeneous and was deposited more or less continuously without erosion. Its plural is strata.

b) Disadvantages of Stratified Sampling

Disadvantages of applying stratified sampling over other sampling methods are:-

i. Requires selection of relevant stratification variables which can be difficult.
ii. Is not useful when there are no homogeneous subgroups.
iii. Can be expensive to implement.

iv. Cluster Sampling

Adèr et al. (2008) and De Vaus (2011) define cluster sampling as the technique on the surface similar to stratified sampling that is applied by dividing the population into discrete or separate groups. Saunders et al. (2007) adds that sometimes it is more cost-effective to select respondents in groups (clusters). By this sampling, the population is often clustered by geography, or by time periods. For instance, if surveying households within a city, we might choose to select 100 city blocks and then interview every household within the selected blocks. Therefore, clustering can reduce travel and administrative costs. In the example above, an interviewer can make a single trip to visit several households in one block, rather than having to drive to a different block for each household. According to Saunders et al. (2007), it also means that one does not need a sampling frame listing all elements in the target population. Instead, clusters can be chosen from a cluster-level frame, with an element-level frame created only for the selected clusters. The example above only requires a block-level city map for initial selections, and then a household-level map of the 100 selected blocks, rather than a household-level map of the whole city.

v. Multi-stage Sampling

Multi-stage sampling is commonly implemented as multi-stage cluster sampling. Kumar (2005) coments that it is a complex form of cluster sampling in which two or more levels of units are embedded, one in the other. The first stage consists of constructing the clusters that will be used to sample from. In the second stage, a sample of primary units is randomly selected from each cluster (rather than using all units contained in all selected clusters). In following stages additional samples of units are selected in each of those selected clusters and so on. All ultimate units (individuals, for instance) selected at the last step of this procedure are then surveyed. Thus, this technique is essentially the process of taking random sub-samples of preceding random samples. Kumar (2005) and Saunders et al. (2007) observe that multistage sampling is used in order to overcome the challenges associated with geographical scattered populations where face-to-face contact is needed and time consuming to construct a sampling frame for a large geographical area.

4.8.2 Non-probability Sampling

Non-probability sampling is a method where some elements of the population have no chance of being selected or where the probability of selection can't be accurately determined. It involves the selection of elements based on assumptions regarding the population of interest, which forms the criteria for selection. Babbie (2007), Stuart (2009) and Leedy (2013) argue that the selection of elements is non-random, non-probability sampling that does not allow the estimation of sampling errors The methods include Quota Sampling, Accidental or Convenience Sampling, Purposive or Judgemental Sampling and Snowball Sampling. In addition, non response effects may turn any probability design into a non probability design if the characteristics of non-response are not well understood, since non response effectively modifies each element's probability of being sampled. Within any of the types of frame identified above Mellenbergh and Adèr et al. (2008) note that a variety of sampling methods can be employed, individually or in combination. Factors commonly influencing the choice between these designs include: nature and quality of the frame; availability of auxiliary information about units on the frame; accuracy requirements, and the need to measure accuracy; whether detailed analysis of the sample is expected; and Cost/operational concerns.

i) Quota Sampling

Kamuzora (2005) notes that quota sampling it is a judgemental sampling with the constraint that a sample includes a minimum number from each specified subgroups in the population. Under this technique Aaker et al. (2012) confirms that the population is first segmented into mutually exclusive sub-groups, just as in stratified sampling. Then judgement is used to select the subjects or units from each segment based on a specified proportion. For example, an interviewer may be told to sample 200 females and 300 males between the age of 45 and 60. It is this second step which Aaker, et al. (2012) thinks is what makes the technique to be one of non-probability sampling. In quota sampling the selection of the sample is non-random. For example, interviewers might be tempted to talk to those who look most helpful. The problem is that these samples may be biased because not everyone gets a chance of selection. This random element is its greatest weakness and quota versus probability has been a matter of controversy for many years.

ii) Accidental or Convenience Sampling

Babbie (2007), Ghauri and Grønhaug, (2005) view that accidental sampling (also known as grab, convenience or opportunity sampling) is one of the types of non-probability sampling whereby the sample is drawn from the population but very close to hand. That is, a population is selected because it is readily available, willing and convenient. It may be through meeting the person or including a person in the sample when one meets them or chosen by finding them through technological means such as the internet or through phone. The researcher using such a sample cannot scientifically make generalizations about the total population from this sample because it would not be representative enough. For example, if the interviewer were to conduct such a survey at a shopping centre early in the morning on a given day, the people that he/she could interview would be limited to those given by such respondents at that given time, which would not represent the views of other members of society in such an area, if the survey were to be conducted at different times of day and several times per week. This type of sampling is most useful for pilot testing.

iii) Purposive or Judgemental Sampling

A purposive or judgmental sample is selected based on the knowledge of a population and the purpose of the study. According to Babbie (2007) and Dillon, et al. (2005), with purposive sampling a decision with regard to which element, respondent or item to be included in the sample rests on the researcher's judgement and intuition. The researcher uses a purposive sample because those being interviewed fit a specific purpose. Kumar (2005) find this method as less expensive and quick for selecting a sample although it is prone to biasness. This is because the researcher does not have a real basis for making inferences to a large population as the technique is not based upon a probability model.

iv) Snowball Sampling

Babbie (2007) and Robson (2013) refer to snowball sample according asa sampling technique in which the researcher collects data on the few members of the target population he or she can locate then asks those individuals to provide information needed to locate other members of that population whom they know. For example, if a researcher wishes to interview unregistered immigrants from Somalia to Tanzania, he or she might interview a few unregistered Somalis that he or she knows or can locate and would then rely on respondents to locate more unregistered individuals. A snowball sample is appropriate to use in research when the members of a population are difficult to locate like immigrants. According to Yin (2014), the technique is employed when a researcher is not certain that the respondents have relevant data for the

intended study but he knows a few of them. The researcher interview or provides questionnaires to those few and ask them to identify others who are likely to have the required data.

4.9 Data Collection

The search for answers for research questions calls for collection of data. According to Dellinger and Leech (2007), the word data refers to facts, figures and other relevant materials, past and present, serving as basis for study and analysis. Inaccurate data collection approach can impact on the results of a study and ultimately lead to invalid results (Dellinger and Leech, 2007). Data collection methods for impact evaluation vary along a continuum. At the one end of this continuum are quantitative methods and at the other end of the continuum are qualitative methods for data collection. Adam and Kamuzora (2008) define data collection as a term used to describe a process of preparing and collecting data. They refer to the purpose of data collection as to obtain information for record keeping, decision making or for passing information on to others regarding a specific topic.

4.9.1 Importance of Data

Data serve as the bases or raw materials for analysis. According to Mellenbergh and Adèr (2008), without an analysis of factual data, no specific inferences can be drawn on the questions under study. Inferences based on imagination or guesswork cannot provide correct answers to research questions. The relevance, adequacy and reliability of data determine the quality of the findings of a study. Data form the basis for testing the hypotheses formulated in a Study. Data also provide the facts and figures required for constructing measurement scales and tables, which are analysed with statistical techniques. Inferences on the results of statistical, analysis and tests of significance provide the answers to research questions. Thus the scientific process of measurement, analysis, testing and inferences depends on the availability of relevant data and their accuracy.

4.9.2 Types of Data

Sekaran (2006) and Johnson and Christensen (2010) indicate that the data needed for a social science research may be broadly classified into groups of data namely (a) Data pertaining to human beings, (b) Data relating to organisations, and (c) Data pertaining to territorial areas. Personal data or data related to human beings consist of demographic and socio-economic characteristics of individuals like age, sex, race, social class, religion, marital status, education, occupation, income, family size, location of the household, and life styles and behavioural variables like attitudes, opinions, awareness, knowledge, practice, and

intentions. Organisational data consist of data relating to an organisation's origin, ownership, objectives, resources, functions, performance and growth. Territorial data are related to geophysical characteristics, resources endowment, population, occupational pattern, infrastructure, economic structure and degree of development. of spatial divisions like villages, cities, Tabias, Woredas, states and provinces, nations, regional blocks and the. According to Sekaran, (2006), there are two major types of data namely (a) primary data and (b) secondary data and the sources of data are basically classified into (a) primary sources and (b) secondary sources.

i. Primary Data

When secondary information are not available or unable to support the study at hand, Sekaran, (2006) suggests that the researcher must collect data that are relevant to the particular study and research problem and these are called Primary Data. According to Kothari (2004), Berg (2014) and Dillman et al. (2009), primary data are original information from which the researcher directly collects from primary sources be it respondents, units or organisations that have not been previously collected such as on brand awareness, brand preference, brand loyalty and other aspects of consumer behaviour from a sample of consumers. Primary data are first-hand information collected through various methods such as observation, interviewing and questionnaire filling.

a) Advantages of Primary Data

Primary data have the following advantages:

i. They are collected for a specific project at hand.
ii. They are more consistent with research questions and research objectives.

b) Disadvantages of Primary Data

The following are disadvantages of application of primary data:

i. Are expensive: they can take long time to collect and cost a lot of money.
ii. Sometimes not easy to access primary data (its not always possible to get respondents who are willing to cooperate and give accurate answers.
iii. Difficult to choose and apply proper methods and instruments for a particular study.
iv. It is difficult to ensure credibility, quality and scope of information gathered from primary sources.

ii. Secondary Data

Johnson and Christensen (2010) reveal that secondary data are information that has been previously been collected and compiled for another purpose therefore are collected from secondary sources. secondary data consist of readily available compendia and already compiled statistical statements and reports whose information may be used by researchers for their studies such as census reports, annual reports and financial statements of companies, reports of government departments, annual reports, statistical statements by various organizations such as cooperatives, commissions, financial institutions, trade reports, international organisations such as the United Nations, IMF and World Bank. Secondary data consist of not only published records and reports, but also unpublished records. The latter category includes various records and registers maintained by firms and organisations such as accounting and financial records, personnel records, register of members, minutes of meetings and inventory records.

Kamuzora (2005) and Kothari (2004) clarify that although secondary data are diverse and consist of all sorts of materials, they have certain common characteristics. First, they are readymade and readily available, and do not require the trouble of constructing tools and administering them. Secondly, they consist of data over which a researcher has no original control over collection and classification. This is a feature which can limit the value of secondary sources. One may see that this is a feature which can limit the research value of secondary sources thirdly, secondary sources are not limited in time and space, that is, the researcher using them need not have been present when they were gathered. secondary data are used in three ways (Krishnaswami,2013)). First, some specific information from them may be used for reference purposes. Secondly, may be used as bench marks against which the findings of a research may be tested. Finally, secondary data may be used as the sole source of information. Krishnaswami (2013) and Kothari (2004) presented a list of advantage and disadvantages of secondary data as follows:

a) Uses of Secondary Data

Ghauri and Grønhaug (2005)believe that secondary data are useful not only to find information to solve our research problem but also to better understand and explain our research problems. The secondary data may be used in three ways by a researcher. First, some specific information from secondary sources may be used for reference purposes. Second, secondary data may be used as bench marks against which the findings of a research may be tested. Finally, secondary data may be used as the sole source of information for a research project. Such studies as securities market behaviour, financial analysis of companies, and trends in credit allocation in commercial banks, sociological studies on crimes, historical

studies, and the like depend primarily on secondary data. Year books, Statistical reports of government departments, reports of public organisations such as bureau of public enterprisesand census reports serve as major data sources for such research studies.

b) Advantages of Secondary Data

Advantages of employing secondary data in research work include the following:

i. can be quickly and cheaply secured (it serves time and money);
ii. has a wider geographical area and longer reference period covered without much cost;
iii. provides literature review and help in problem formulation to more focused research questions;
i. guides and gives suggestions on proper research methods for particular research;
iv. facilitates cross-cultural and international researches
v. broadens the database from which scientific generalizations can be made; and
vi. enables a researcher to verify the findings based on primary data.

c) Disadvantages of Secondary Data

There are numbers of some serious drawbacks in working with secondary data as follows:

ii. available data may not meet the specific research needs;
iii. may not be as accurate as desired;
iv. not current and may become obsolete when they appear in print; and
v. information about the whereabouts of sources may not be available to social scientists.

4.10 Methods of Data Collection

There are various methods of data collection. However, 'methods' are different from 'Tools'. While a method refers to the way or mode of gathering data, a tool is an instrument used for the method. The researcher directly collects primary data from original sources or primary sources while collecting secondary data from secondary sources. according to Green et al. (2006), some of the required types of social science data such as socio-economic surveys, social anthropological studies of rural communities and tribal communities, sociological studies of social problems and social institutions, marketing research, leadership studies, opinion polls, attitudinal surveys, readership, radio listening and television viewing surveys, knowledge-awareness practice studies, farm management studies and business management studies are not available from original sources. They have to be gathered from the secondary sources.

Although the collection of primary data is costly and time consuming, where the available data are inappropriate, inadequate or obsolete, primary data have to be gathered.

Kothari (2009) comments that research techniques always depend on the type of research, data collection method and instruments of data collection and recording data, techniques of processing data and the like. The data collection method also determines instruments to be used. Table 4.1 presents the different methods and techniques of data collection.

Table 4.1: Data Collection Methods and Techniques

RESEARCH TYPES	METHODS	TECHNIQUES
1. Library Research	(i) Analysis of historical records	Recording of notes, content analysis, tape and film listening and analysis;
	(ii) Analysis of documents	Statistical compilations and manipulations, reference and abstract guides, contents analysis;
2. Field Research	(i) Non-participant direct observation	Observational behavioural scales, use of score cards, etc.
	(ii) Participant observation	Interactional recording, possible use of tape recorders, photo graphic techniques;
	(iii) Mass observation	Recording mass behaviour, interview using independent observers in public places;
	(iv) Mail questionnaire	Identification of social and economic background of respondents;
	(v) Opinionnaire	Use of attitude scales, projective techniques, use of sociometric scales;
	(vi) Personal interview	Interviewer uses a detailed schedule with open and closed questions;
	(vii) Focused interview	Interviewer focuses attention upon a given experience and its effects;
	(viii) Group interview	Small groups of respondents are interviewed simultaneously.
	(ix) Telephone survey	Used as a survey technique for information and for discerning opinion; may also be used as a follow up of questionnaire;
	(x) Case study and life history	Cross sectional collection of data for intensive analysis, longitudinal collection of data of intensive character; and
3. Laboratory Research	Small group study of random behaviour, play and role analysis	Use of audio-visual recording devices, use of observers, etc.

Source: Kothari, 2009

Creswell (2012) proposes various methods of data collection. He reveals that the various methods of data gathering involve the use of appropriate recording forms. The important methods are Observation, Experimentation, Interview, Mail Survey, Simulation, Panel Method, Projective Technique and Sociometry. Each of these tools according to him, are employed for a specific method of data gathering. Observation schedule for observation method, interview schedule and interview guide for interviewing, questionnaire for mail survey, and so on. A researcher can use one of them or a combination of two or more instruments

depending on the nature of the study including observation, experimentation, interview; mail survey or questionnaire filling simulation, and projective technique.

Creswell (2012) opines that observation involves gathering of data relating to the selected research by viewing and/or listening. Interviewing involves face-to-face conversation between the investigator and the respondent. Mailing is used for collecting data by getting questionnaires completed by respondents. Experimentation involves a study of independent variables under controlled conditions. Experiment may be conducted in a laboratory or in field in a natural setting. Simulation involves creation of an artificial situation similar to the actual life situation. Projective methods aim at drawing inferences on the characteristics of respondents by presenting to them stimuli. The choice of the methods of data collection depends on its unique features which should be compared with the needs and conditions of the study before the choice of the methods is decided.

4.10.1 Observation

Kumar (2005) and Saunders et al. (2007) propose that observation is viewing or seeing. Most of such observations are just casual and have no specific purpose. In research, observation as a method of data collection is different from such casual viewing. They define observation as a systematic viewing of a specific phenomenon in its proper setting or the specific purpose of gathering data for a particular study. Observation as a method includes both seeing and hearing. It is accompanied by perceiving as well. The method plays a major role in formulating and testing hypothesis in social sciences (Green et al., 2006). Whereas behavioural scientists observe interactions in small groups; anthropologists observe simple societies, and small com-munities; political scientists observe the behaviour of political leaders and political institutions while business researchers observe consumer behaviour. Kumar (2005) and Saunders et al. (2007) classify observation in different ways. It can be classified with reference to the researcher's role as participant observation and non-participant observation. It can be classified in terms of the mode of observation as direct observationand indirect observation. It can be classified with reference to the the rigour of the system adopted as controlled observation and uncontrolled observation.

4.10.2 Experimentation

Brownlee (2006) describes experimentation as a research process used to study the causal relationships between variables. It aims at studying the effect of an independent variable on a dependent variable, by

keeping the other independent variables constant through some type of control. For example, a -social scientist may use experimentation for studying the effect of a method of family planning publicity on people's awareness of family planning techniques. Adèr et al. (2008) remarks that experiment is often difficult to design and time consuming. The weakness of any experimental study is its inability to specify causes and effect. It can show only correlations between variables, but correlations alone never prove causation. The experiment is the only method, which can show the effect of an independent variable on dependent variable. In experimentation, the researcher can manipulate the independent variable and measure its effect on the dependent variable. Moreover, experiment provides the opportunity to vary the treatment (experimental variable) in a systematially, thus allowing for the isolation and precise specification of important differences. The applications of experimental method are laboratory experiment and field experiment.

4.10.3 Interview

Interview is one of the major methods of data collection. Stake (2005) defines it as a two-way systematic conversation between an investigator (researcher) and an informant (respondent) initiated for obtaining information relevant to a specific study. An interview involves not only conversation but also learning from the respondents' gestures, facial expressions and pauses and his environment. Interviewing requires face-to-face contact or contact over telephone and computers. It is conducted by using a structured schedule or an unstructured guide. Stake (2005) finds an interview superior to other data-gathering methods. It can be applied either as a main method or a supplementary one in studies about people. Interviewing is the only suitable method for gathering information from illiterate or less educated respondents. It is useful for collecting a wide range of data from factual demographic data to highly personal and intimate information relating to a person's opinions, attitudes, and values, beliefs, past experience and future intentions. This method can add flesh to statistical information. It enables the researchers to grasp the behavioural context of the data furnished by the respondents. It permits the investigator to seek clarifications and brings to the forefront those questions, that for one reason or another, respondents do not want to answer.

Stake (2005) adds that the interviews may be classified into five types: (a) structured or directive interview, (b) unstructured or non-directive interview, (c) focused interview, and (d) clinical interview and (e) depth interview. All these types can take place in the form of face-to-face interview, telephone interview and group interview. The interviewing process consists of different stages such as preparation, introduction,

developing rapport, carrying the interview forward, recording the interview, and closing the interview as follows,

i. Telephone Interviewing

Telephone interviewing is a non-personal method of data collection. It is done by direct speaking with the respondent over the telephone.

ii. Group Interviews

Group interview may be defined as a method of collecting primary data in which a number of individuals with a common interest interact with each other. In a personal interview, the flow of information is multidimensional.

iii. Interviewing Process

The interviewing process consists of the following stages:

a) Preparation,
b) Introduction,
c) Developing rapport,
d) Carrying the interview forward,
e) Recording the interview, and
f) Closing the interview.

4.10.4 Mail Survey

A mail survey is a method of collecting data that involves giving or sending questionnaires to the respondents with a request to complete and return the questionnaires by post Yin, (2014). This method can be used mainly in the case of educated respondents. The mail questionnaire is always simple so that the respondents can easily understand the questions and be able to answer them. It may be in the form of closed-ended, open-ended and multiple-choice questions so that it could be completed. The distinctive feature of the mail survey is that the questionnaire is self-administered by the respondents themselves and the responses are recorded by them (Yin, 2014). It does not involve face-to-face conversation between the investigator and the respondent. Communication is carried out only in writing and this requires more cooperation from the respondents than verbal communication does. He proposes that there are different alternative methods of distributing questionnaires to the respondents including (i) personal delivery (ii)

attaching advertising questionnaire to a product (iii) advertising questionnaire in a newspaper or magazine (iv) targeted in the public places such as hotels and (iv) news stand inserts.

4.10.5 Simulation

Simulation is one of the forms of observational methods (Creswell, 2012). It is a process of conducting experiments on a symbolic model representing a phenomenon. Abelson (date?) defines simulation as "the exercise of a flexible imitation of processes and outcomes for the purpose of clarifying or explaining the underlying mechanisms involved." It is a symbolic abstraction, simplification and substitution for some referent system. In other words, simulation is a theoretical model of the elements, relations and processes which symbolize some referent system, e.g., the flow of money in the economic system may be simulated in a operating model consisting of a set of pipes through which liquid moves. Simulation is thus a technique of performing sampling experiments on the model of the systems. The experiments are done on the model instead of on the real system, because the latter would be too inconvenient and expensive. Therefore, simulation is a recent research technique but it has deep roots in history. Chess has often been considered a simulation of medieval warfare.

4.10.6 Panel Method

Malhorta (2009) describes the panel method as a method of data collection by which data is collected from the same sample of respondents at intervals either by mail or by personal interview. This is used for longitudinal such studies as on economic conditions, expenditure pattern, consumer behaviour, recreational pattern, effectiveness of advertising, voting behaviour. The period, over which the panel members are contacted for information may spread over several months or years. The time interval at which they are contacted repeatedly may be 10 or 15 days, or one or two months depending on the nature of the study and the memory span of the respondents. Malhorta (2009) observes that the basic characteristic of the panel method is successive collection of data on the same items from the same persons over a period of time. The type of information to be collected should be such facts that can be accurately and completely furnished by the respondent without reservation. The number of item should be as few as possible so that they could be furnished within a few minutes, especially when mail survey is adopted. The panel method requires carefully selected and well-trained field workers and effective supervision over their work. Malhorta (2009) concludes that the panel may be static or dynamic. A static or continuous panel is one in which the membership remains the same throughout the life of the panel, except for the members who drop out and the dropouts are not replaced.

4.10.7 Projective Techniques

Malhorta (2009) and Yin (2014) view that projective techniques are the direct methods of data collection through personal interview, telephone interview and mail survey rely on respondents' own report of their behaviour, beliefs and attitudes.However, respondents may be unwilling to discuss controversial issues or to reveal intimate information about themselves or may be reluctant to express their true views fearing that they are generally disapproved. In order to overcome these limitations, indirect methods have been developed. Projective techniques are such indirect methods. They became popular during the 1950s as a part of motivation research. Projective techniques involve presentation of ambitious stimuli to the respondents for interpretation. In doing so, the respondents reveal their inner characteristics. The stimuli may be a picture, a photograph, an inkblot or an incomplete sentence. The basic assumption of projective techniques is that a person projects his own thoughts, ideas and attributes when he perceives and responds to ambiguous or unstructured stimulus materials. Thus a person's unconscious operations of the mind are brought to a conscious level in a disguised and projected form, and the person projects his inner characteristics. Projective techniques may be divided into three broad categories: (a) visual projective techniques (b) verbal projective techniques, and (c) expressive techniques.

4.10.8 Sociometry

Creswell (2012) refers to sociometry as a method for discovering, describing and evaluating social status, structure and development through measuring the extent of acceptance or rejection among individuals in groups. Ghauri and Grønhaug (2005) define sociometry as a method used for the discovery and manipulation of social configurations by measuring the attractions and repulsions between individuals in a group. In addition, they look at Sociometry as a statistical study of behaviour and relationships within social groups, especially expressed in terms of preferences. It is a means for studying the choice, communication and interaction patterns of individuals in a group. It is concerned with attractions and repulsions between individuals in a group. In this method, a person is asked to choose one or more persons according to specified criteria, in order to find out the person or persons with whom he will like to associate.

The basic technique in sociometry is the sociometric test. Creswell (2012) clarifies it as a test under which each member of a group is asked to choose from all other members those with whom he prefers to associate in a specific situation. The situation must be a real one to the group under study such as group

study, play, class room seating for students of a public school. A specific number of choices say two or three to be allowed is determined with reference to the size of the group, and different levels of preferences are designated for each choice. Ghauri and Grønhaug (2005) suggest that if we desire to find out the likings and disliking of persons in a work group consisting of 8 persons. If each person is asked to select 3 persons in order or preference with whom he will like to work on a group assignment. The levels of choices are designated as: the first choice by the number 1, the second by 2, and the third by 3.

4.11 Instruments of Data Collection

Research instruments sometimes called data Collection tools or instruments of data collection are helpful because they provide a picture of researcher's work environment [Berg (2014), Adam and Kamuzora (2008)]. The aim for using tools is to facilitate a researcher to clarify information, process knowledge, and identify opportunities for continuous improvement. A researcher needs a systematic way and tools of collecting multiple sources of data and the time to reflect the research objective. Data is necessary to quantify information and can be collected through the use of different data collection methods and instruments. Triangulation requires the collection of data from a variety of sources, in the use of different methods and techniques, with a variety of perspectives.

The term research instrument is preferable for a survey research method because it is neutral and does not imply a methodology. A research instrument can be administered as part of an experiment, a mailed survey or questionnaire, a semi-structured interview, or a Web survey or questionnaire. Therefore,, the gathering of quantitative data directly from respondents should likely not be called a survey. The term experimental instrument is preferred as a neutral term for capturing data in experiments, for example. Meanwhile, Berg, (2014) suggests the use of questionnaire as well, but, like survey, has connotations of a mailed instrument. Within each general research approach, one or many data collection instruments may be used. A researcher decides for one or multiple data collection tool(s) while considering its overall appropriateness to the research, along with other practical factors, such as: expected quality of the collected data, estimated costs, predicted non-response rates, expected level of measure errors, and length of the data collection period. It is also possible that a given research question may not be satisfactorily studied because a certain data collection instrument is not adequate to collect the needed data to answer such a question. However, Babbie (2007) maintains that the most popular data collection tool or instrument is questionnaire.

4.11.1 Types of Research Instruments

The various methods of data gathering involve the use of appropriate recording forms (Adam, and Kamuzora, 2008). These are called tools or instruments of data collection. They consist of Observation schedule; Interview guide; Interview schedule; Questionnaire; Rating scale; Checklist; Document schedule/data sheet; and Schedule for institutions. However, each of the tools is used for a specific method of data gathering: observation schedule for observation method, interview schedule and interview guide for interviewing, questionnaire for mail survey, and so on.

4.11.2 Functions of Research Instruments

A number of scholars including Babbie (2007); Malhorta (2009) and Boote and Beile (2005) confirm that tools of data collection translate the research objectives into specific questions or items, the responses to which will provide the data required to achieve the research objectives. In order to achieve this purpose, each question/item must convey to the respondent the idea or group of ideas required by the research objectives, and each item must obtain a response which can be analysed for fulfilling the research objectives. Information gathered through the tools provides descriptions of characteristics of individuals, institutions or other phenomena under study. It is useful for measuring the various variables pertaining to the study. The variables and their interrelationships are analysed for testing the hypothesis or for exploring the content areas set by the research objectives.

4.11.3 Factors for Selecting an Instrument

Babbie (2007) indicates that factors or criteria to consider when selecting an instrument to be applied for data collection include:

a) Well-tested factorial structure, validity and reliability,
b) Availability of supportive materials and technology for entering, analyzing and interpreting results,
c) Availability of normative data as a reference for evaluating or interpreting,
d) Applicability to wide range of participants,
e) User-friendliness and administrative ease,
f) Availability (is it readily available when needed?),
g) Permission (Does it require permission from the owner to use it?)
h) Financial cost (is it affordable?),
i) Amount of time required to prepare and apply it.

Creswell (2012), Babbie (2007), Ghauri and Grønhaug (2005) present a brief description of the various instruments of data collection as follows:

i) Observation Schedule

This is a form on which observations of an object or a phenomenon are recorded. The items to be observed are determined with reference to the nature and objectives of the study. They are grouped in appropriate categories and listed in the schedule in the order in which the observer would observe them. The schedule must be so devised as to provide the required verifiable and quantifiable data and to avoid selective bias and misinterpretation of observed items. The units of observation must be simple and meticulously worded so as to facilitate precise and uniform recording.

ii) Interview guide/schedule

This is used for non-directive and depth interviews. It does not contain a complete list of items on which information has to be elicited from a respondent: it just contains only the broad topics or areas to be covered in the interview. Interview guide serves as a suggestive reference or prompter during interview. It aids in focusing attention on salient points relating to the study and in securing comparable data in different interviews by the same or different interviewers.

iii) Questionnaire

These tools are widely used in surveys and are complete lists of questions on which information is elicited from the respondents. The basic difference between them lies in recording responses. Sometimes the interviewer fills out a questionnaire for respondents who are not able to write and other respondent completes a questionnaire themselves.

iv) Rating Scale

This is a recording form used for measuring individual's attitudes, aspirations and other psychological and behavioural aspects, and group behaviour.

v) Checklist

This is the simplest of all the devices. It consists of a prepared list of items pertinent to an object or a particular task. The presence or absence of each item may be indicated by checking 'yes' or 'no' or

multipoint scale. The use of a checklist ensures a more complete consideration of all aspects of the object, act or task. Checklists contain terms which the respondent understands and which more briefly and succinctly express his views than answers to open-ended question. It is a crude device, but careful pre-test can make it less so. It is at best when used to test specific hypothesis. It may be used as an independent tool or as a part of a schedule or questionnaire.

vi) Document Schedule/Data Sheet

This is a list of items of information to be obtained from documents, records and other materials. In order to secure measurable data, the items included in the schedule are limited to those that can be uniformly secured from a large number of case histories or other records.

vii) Schedule for Institutions

This is used for survey of institutions such as business enterprises, educational or academic, social or cultural organisations and the like. It will include various categories of data relating to their profile, functions and performance. These data are gathered from their records, annual reports and financial statements.

4.11.4 Construction of Schedules and Questionnaires

Schedules and questionnaires are the most common instruments of data collection and have much in common. Kumar (2005) observes that both of them contain a set of questions logically related to a problem under study. In both cases the content, response structure, the wordings of questions and question sequence are the same for all respondents. However, while schedules are used as a tool for interviewing, questionnaires are used for mailing and sometimes are directly distributed to respondents who independently fill them in.

Babbie (2007) and Kumar (2005) notice a subtle difference between these two recording forms. The interviewer in a face-to-face interviewing fills a schedule whereas the respondent himself fills in a questionnaire. Thus, the tool is referred to as a schedule when it is used for interviewing and it is called a questionnaire when it is sent to a respondent for completion and return. The process of construction of a schedule and a questionnaire is almost the same. This process is not a matter of simply listing questions that come to researchers' mind. It is a rational process involving much time, effort and thought. Kumar (2005) suggests that the construction of schedule and questionnaire should consist of the major steps as indicated in table 4.2:

Table 4.2: Major Steps in Construction of Interview Schedule and Questionnaire

	STEP	REASON
1	Determination of required Data	ensuring a logic flow in order to obtain required data of the given study
2	Preparation of Dummy tables	dummy tables is the best way to display the data to be gathered
3	Determination of the respondents	choosing respondents with knowledge, understanding and level related to the problem under study thus the choice of words and concepts depends them
4	Choosing Data collection method	To determine which communication mode is most appropriate
5	Instrument drafting	Outline of the instruments, listing the various categories of data and compilation of all conceivable items relevant to the data need
6	Evaluation of the instruments	rigorously examination of each question in the draft instrument
7	Pre-testing	pre-testing of the draft instruments to identify the weaknesses and to make necessary corrections
8	Specification of procedures	specifying the procedures or instruction relating to the use intruments after finalising their pre-tests
9	Format Designing	Dividing instruments into different sections relating to the different aspects of the problem

Source: Kumar (2005)

4.11.5 Questions Construction

Interview schedule or questionnaire (a survey instrument) is useful for collecting various types of information such as (a) factual information; facts about the respondents: sex, age, marital status, education, religion, caste or social class, income and occupation; and facts about events and circumstances, (b) psychological information such as attitudes, opinions, beliefs, and expectations, and (c) behavioural information such as social participation (Leedy, 2013 and Stake, 2005). Once the information need is determined as explained in the previous topic, we can begin question construction. This involves four major decision areas. They are (a) question relevance and content (b) question wording (c) response form and (d) question order or sequence.

The question to be included in the instrument should pass certain tests. Some of the critical tests include relevance to the research objectives and its ability to yield significant information for answering an investigative question. The function of a question in a schedule/questionnaire is to elicit particular information without distortion. According to Leedy (2013) and Stake (2005), questioning people is more like trying to catch a particular elusive fish by hopefully casting different kinds of bait at different depths without knowing what goes on beneath the surface. As the meaning of words differs from person to person, the question designer should choose words which have the characteristics such as shared vocabulary, uniformity of meaning, exactness, simplicity and neutrality. Thus, the words to be used must be neutral ones. That is, they must be free from the distorting influence of fear, prestige, bias or emotion. The

challenges that face researchers during question wording include unwarranted assumptions, personalization, presumptions, hypothetical question and questions in embarrassing matters.

4.11.6 Response form or types of Questions

The third major area in question construction is the types of questions to be included in the instrument. They may be classified into open questions and closed questions. Closed questions may be dichotomous, multiple choice or declarative ones. The researcher should avoid the types of questions including: (a) Leading questions (b) 'Loaded' questions (c) Ambiguous questions (d) Double-barrelled (e) Long questions (t) Avoid double negative. The order in which questions are arranged in a schedule/questionnaire is as important as question wording. It has two major implications. First, an appropriate sequence can ease the respondent's task in answering. Second, the sequence can either create or avoid biases due to context effects. That is, the effects of proceeding questions on the response to later questions. In addition to question wording and question construction, the mechanics of the form should also be considered in the design of an interview schedule or questionnaire. The mechanics of the form has several aspects: items of the form, instruction, pre-coding, sectionalisation, spacing, paper, printing and margins. Leedy (2013) and Stake (2005) suggest the following as mandatory items for construction of interview schedules and questionnaires.

i. The name of the organization collecting the data should be on top of front page,
ii. The title of the study in large print next on the front page,
iii. The confidentiality of the data should be made clear,
iv. A place for writing the date of filling in the form,
v. A serial number to each copy of the tool,
vi. The pages of the instrument should be numbered,
vii. Note of thanks: a final note of thanks for respondent's cooperation.

4.12 Data Processing Analysis and Presentation

Creswell (2012) regards data processing as an intermediary stage of work between data collection and data analysis. The instruments of data collection such as interview schedules, questionnaires, data sheets and field notes contain a vast mass of data. They cannot straightaway provide answers to research questions; they, like raw materials, need processing. Data processing involves classification, organising and summarisation of data in order to make it suitable to analysis.

4.12.1 Data Processing

Data processing requires advance planning at the stage of planning the research design [White (2012), Ssegawa and Rwelamila (2009); Kothari (2004); Robson (2013), Groves, et al. (2009); and Institute of Finance Management-IFM (2012)]. This advanced planning may cover such aspects as categorization of variables and preparation of dummy tables. This should be done with reference to the requirements of testing hypotheses/investigative questions. This type of pre-planning ensures better identification of data needs and their adequate coverage in the tools for collection of data. Data processing consists of a number of activities including (i) editing, (ii) classification and coding, (iii) tabulation; and (iv) graphic representation. The activities are summarised in table 4.3 hereunder:

Table 4.3: Clarifications of Data Processing Activities

Activity	Definition	Clarifications
Editing	A process of checking to detect and or correct errors and omissions	Editing is done at two stages: first at the fieldwork stage and second at office. The schedule is reviewed to complete abbreviated responses, rewrite illegible responses and correct omissions.
Classification and Coding	Assigning numerals or other symbols to the categories or responses	Responses or data are classified and coded into meaningful categories so as to bring out essential pattern. Hundred responses are reduced to smaller number of appropriate categories containing critical information needed for analysis. The coding schemes such as sex, age, type of house with their assigned symbols together with specific coding instructions may be assembled in a book or computer.
Tabulation	The process of summarising raw data and displaying them on compact statistical tables in vertical columns and horizontal rows for further analysis.	Tables facilitate comprehending masses of data at a glance; they conserve space and reduce explanations and descriptions to a minimum; they give a visual picture of relationships between variables and categories; they facilitate summation of items and the detection of errors and omissions; and they provide a basis for computations.
Graphic Representations	The use of graphics, charts and other pictorial devices to present collected data.	Graphic presentation reduces large masses of statistical data to a form that can be quickly understood at a glance. The most commonly used graphic forms include: Line graphs or charts; Bar Charts, Segmental representations, Histograms and Pictographs.

Source: White (2012)

4.12.2 Data Analysis and Interpretation

Data analysis involves critical thinking. Green, et al. (2006) and De Vaus (2011) suggest that this is done only after collecting all the data and always focused on the research problems and the hypothesis and questions rose in the statement of the problem. Here the research compiles or summarizes the results in a logical order usually in relation to the hypotheses and objectives of the study. After a brief introduction on

the main results or features of the findings of the study, the data are described and interpreted in sufficient detail leading to the ultimate conclusion. Tables, graphs and illustrations are used to support or present the data more clearly and economically.

The analysis involves examination and evaluation of some phenomenon by dividing it into some constituent parts and identifying the relationships among the parts in the context of the whole. It interprets the relationships to explain or make some intended generalization governing the behaviour of the phenomenon. The researcher summarizes the main findings of his study and the implications. Normally the conclusion summarises the main results of the research and describes what they mean for the general field.

4.12.3 Presentation of Findings

Research has little value if it is not put together in the form of a report. White (2012) observes that a research represents a scientific method of establishing knowledge that is cumulated. Therefore, scientific findings must be properly documented and reported through appropriate media. Decision on writing style and method of presentation depends on the intended purposes and prospective readers. Ssegawa and Rwelamila (2009), White (2012) and Hart (2011) comment that the effective writing is a tool that helps to ensure understanding and use of the results of the study. It is helpful to have an outline to work with in preparing a research report. Findings should be reported following the chronological order as stipulated in the research proposal. Whenever results are not conclusive, some explanation should be provided. When a researcher feels he should express a personal opinion, he should indicate it clearly. A researcher has the obligation to make some comments as to what the findings mean as data do not speak for themselves but must be analysed and interpreted. The researcher must draw conclusions from the analysis and at the end make recommendations on the basis of the data at hand.

4.13 Research Methods for this Study

In order to collect data and obtain information that would enable the required analysis to accomplish this research work, this study selected research methods which are presented in this section. The section explains the research methods that were selected for data gathering and steps for analysis called framework of analysis specifically for this research work. The section presents units of inquiry showing where they are located in Tanzania, research design that was adopted, methods for data collectionnamely interview, survey (questionnaire filling) and observation. It also presents various instruments that were employed for data collection namely questionnaire, interview schedules and documentary sources. The section indicates sampling techniques and sample size selected among the long list to be applied. The section further describes the types of data that was collected for this study including primary and secondary data. Finally, it describes how practically the data was processed, analysed and presented. The selected methods facilitaed collection of data in resonse to the pre-determined research questions, research propositions and specific research objectives.

4.14 Research Design-Case Study

This study adopts a case study research approach. The approach has been selected because the study has an exploratory research objective which is to provide insights and a comprehensive understanding of the problem situation confronting the researcher and the society at large. Cases tudy research approach is applied with intention of gaining an in-depth fact about SCM and to achieve new insights into it. In the context of this study, the idea is to get more insights about the application of model of SCM (SCM) which is expected to be applied in the agricultural sector in Tanzania particularly in the coffee sub-sector in Kagera region. In most cases, a case tudy approach selects a small geographical area or a very limited number of individuals as the subjects of study. In that regard therefore, only coffee among the cash crops in Tanzania has been selected to be studied while in terms of geographical location, only Kagera region has been selected among other eight coffee producing regions in Tanzania.

The objective of choosing case tudy approach is to develop a more understanding of a problem or situation. The researcher has the opinion that a case tudy approach will enable this study to apply what has been learned in one situation to another situation at hand. This will be achieved by conducting a detailed, in-depth examination of one selected situation. It is from this fact that this study has decided to focus on coffee as representatives of other cash crops as well as Kagera as representative of other regions in

Tanzania. Thus, the objective is to gain more light on application of SCM in the agricultural sector, which is expected to be applicable business management approach in the coffee sub-sector. Thus, this approach enabled the researcher to propose the best mode of application of SCM in the agricultural sector in Tanzania. The choice of a case study approach also facilitated observation of an effective system over a period of time. In addition, this approach exposed differences in behaviour and the reason for success that can be subjected to further investigation. Under the case tudy approach data shall be collected by interviewing individuals, from documents of the organisations, published information or simple observation of the coffee production, processing and marketing in Kagera region.

An interesting feature about case tudy approach is the applicability of all methods and instruments of data collection for detailed information. This means that interviews, observation, experiments, survey and all instruments namely observation schedule, interview guide, interview schedule, questionnaire, and documentary sources can be applied to give assurance of getting all required data. The approach is always concerned with understanding the phenomenon in its natural setting and that it has proved to be successful in stimulating discussions, promoting analytical thinking and encouraging researchers and other stakeholders to undertake more studies in question. The researcher's primary concern was not to control or influence the variables to determine behaviour, but to observe the studied entity (in this case coffee SCM in Kagera region) in its natural state. Moreover, the case tudy approach provided the researcher with an opportunity to understand and make practical observations. Therefore, a Case study approach was the appropriate research design for this study.

4.15 Units of Enquiry and Location of the Study (Site)

The main domain of investigation or units of inquiry are located of Kagera Region. The region has been selected to be the area under study because it is found along the boundaries of the country with neighbouring countries of Rwanda, Burundi and Uganda where the dynamics of crop marketing in a liberalised system can easily be studied. Kagera, with a unique characteristic, is the leading coffee producer in the country and produces both main varieties of coffee namely Arabica and Robusta. Figure 4.4 is a map of Africa indicating the location of Tanzania while Figure 4.4 is the map of Tanzania showing the location of Kagera region, the study area.

Figure 4.5: Map of Tanzania Showing: Kagera Region

Figure 4.4: Map of Africa-Location of Tanzania

ICO (2002) and Ghoshray (2010) indicate that worldwide coffee is the second most traded commodity after oil. This study concurs with Cole (2008) that coffee is a loaded word as it is among the most widely traded commodities. It has played a major role in global capitalism for about five hundred years. Apart from this, coffee is historically nationally accepted as a political crop in Tanzania. In addition, it is one of the two largest agricultural export crops in Tanzania with the average foreign exchange earnings of about USD 128.22 million per year (World Bank (2011), Bank of Tanzania (2012) and National Bureau of Statistics (2012) and provides employment to more than 400,000 families in Tanzania. Coffee has been selected as a representative of other cash crops because according to Baffes (2003) it has high value compared to other exports of cash crops since 1994 in Tanzania such that it is credible to collect its available and reliable data and hence its literature is credible and desired. In the financial year 2011/12 coffee recorded growth of foreign exchange earnings of 30.8 percent accrued from export of coffee valued USD 186 million in 2012 compared to exports valued 142.6 in the year 2011 whereby coffee production rose from 39,000 tons in 2011 to 54,800 in 2012.

Table 4.4: Tanzania Foreign Trade-Major Cash Crops 2003-12 (Tshs billion)

CROP	2003	2005	2006	2007	2008	2009	2010	2011	2012
Coffee	15.2	83.6	92.8	143.3	124..1	150.0	162.3	225.7	292.8
Cotton	42.4	127.2	56.8	49.8	95.6	115.2	133.1	103.9	-
Sisal	6.9	8.2	9.3	7.4	18.5	-	11.1	-	-
Cashewnuts	43.4	54.2	62.7	33.8	82.0	94.4	173.2	189.6	222.0
Cloves	10.5	9.6	10.0	10.6	16.0	18.5	11.3	48.4	58.3
Tobacco	47.3	81.4	119.2	116.9	110.2	116.9	114.2	117.0	141.0
Tea	25.7	28.8	41.7	48.3	50.3	88.1	68.1	73.5	87.4

Source: National Bureau of Statistics, 2012 Exchange Rate: 1 USD=Tshs 1,572.00

Kagera region has not been selected only from the fact that it is the leading in coffee production countrywide, but also because it is the only region where the two main coffee varieties of Arabica and Robusta coffee are produced in large quantity in Tanzania. In addition, this study has noted that little has been explored regarding application of SCM in agriculture in the country. In this regard, SCM has been negligibly touched in the area of agriculture hence there is a gap of information on SCM in agriculture and in coffee but more precisely in Kagera region. The study managed to see little literature about coffee marketing while leaving out the aspects of production and processing and without indicating its relation with applicability of SCM in order to link the three major areas of this crop. The little available literature documented by some scholars such as Kessy (2002), Komba (2004), IFAD (2001), Mwakaje (2008) and others are trying to explain what is happening in some segments of the supply chain but not in its totality. Thus, it is difficult to analyse the entire supply chain. It is optimistic that by including production, processing and marketing along the supply chain, this study will fill the existing vacuum. It is from this background that Kagera region has been given a priority to be a study area in order to get adequate and reliable data on coffee for better representation and analysis.

Research sites (units of inquiry) in Kagera include families of individual farmers, District and Regional Agricultural Offices, Co-operative Unions and farmers' associations in the region. In addition to Kagera, the research was conducted at Lyamungo Coffee Research Centre in Moshi and Maruku Research Institute in Bukoba. Research assistants (enumerators) from these research institutes accompanied the researcher to various villages in order to conduct interviews with large number of farmers and leaders of farmers' associations. Other units of inquiry included the headquarters of Tanzania TCB situated in Moshi. In addition government ministries including Ministry of Agriculture, Food Security and Co-operative, Finance, Industries and Trade constituted the domain of research. Other sources of information included libraries of the Tanzania National Bureau of Statistics (NBS), University of Dar es salaam (UDSM), Sokoine University

of Agriculture (SUA), the Bank of Tanzania (BoT), Research on Poverty Alleviation (REPOA), Economic and Social Research Foundation (ESRF), FAO-Dar es salaam Office and the library of UNISA at SBL.

Co-operative unions in Kagera are key providers agricultural services including crop production, processing and marketing support activities and services. This study expects to collect valuable information from them and those cooperative unions in Kagera include:

(i) Karagwe District Co-operative Union (KDCU) for Karagwe and Kyerwa districts
(ii) Kagera Co-operative Union (KCU) for Bukoba, Missenyi and Muleba districts

4.16 Instruments for Data Collection

The study applied four main instruments of data collection namely questionnaire, interview guide and or schedules, observation schedule/sheet and documentary review. Interview schedules and guide were carried as companion to the researcher and were applied simultaneously. These instruments for data collection were used because (i) they are well-tested for factorial structure, validity and reliability, (ii) Availability of supportive materials and technology for entering, analyzing and interpreting results (iii) Availability of normative data as a reference for evaluating and interpreting (iv) Applicable to wide range of participants (v) User-friendliness and administrative ease (vi) Does not require permission from the owner to use (vii) affordable; and (viii) Less time required to prepare and apply.

The researcher assigned research assistants to districts of the research site (Kagera region). They distributed and administered filling of questionnaires while the major researcher, by using interview guide, participated in conducting face-to-face interviews, collect documentary records as well as making an observation on the application of SCM in coffee production, processing and marketing support activities and services. These activities were assessed in terms of behaviour, processes and performance of institutions as the framework of this study indicates. A set of research instruments is attached as annexes I to IV.

4.16.1 Questionnaire

For this study, questionnaire was a major research instrument of collecting specific information about a the research problem and was supplemented by interview guide, observation schedules and documentary records. The developed questionnaires were distributed by research assistants to and filled in by selected respondents in order to obtain adequate data on the subject matter. The researcher had designed two sets

of questionnaire forms for farmers and leaders of farmers' associations (see annexes I and II). The questionnaire contains designed questions where respondents independently answered orally or filled up in the provided spaces. The information obtained was raw data, which after analysis and interpretation, brought result in a better comprehension of the problem. Questionnaire for this study were both structured and unstructured. They were designed in such a way that they were easily filled in by respondents. In some unique circumstances, a questionnaire were mailed to selected respondents in case were away from their expected stations or work places.

Designed questionnaires for collecting information from coffee farmers as well as leaders of farmers' association were both closed-ended and open-ended questions. That is, they contained closed-ended type of questionnaires whereby a respondents were provided with a list of possible answers whereby a respondent could choose one of them, and open-ended questions in which a respondent was not provided with the possible answers for choosing instead he explored many clarifications and answers as much as he or she could. Under the open-ended kind of questions, respondents were asked critical information so that they can be classified as facts and knowledge, opinion, motives, past behaviour as well as future behaviour. The general focus of the questions in this study is to assess if there is any application of SCM along the whole supply chain of inputs, production, processes and marketing of coffee. In addition, the questions were supplemented by examining if there is efficiency in the management system of various coffee management institutions. Finally, the study requested respondent's opinion on the strategies for improving the application of SCM. A detailed cross section of the questionnaire is as follows:

a) Questionnaire for Leaders of Farmers' Association

The questionnaire for leaders of farmers' associations as depicted in I contains mandatory items such the name of the researcher and the university is collaborating with in conducting this study, the title of the study and the confidentialness of the data. The set of questionnaire has a total of 14 questions and the breakdown of questions in the questionnaire is as follows:

i. Questions 1 and 2 request a respondent to provide his/her personal particulars;
ii. Questions 3 and 4 are meant to request a respondent to assess the behaviour of coffee production;
iii. Questions 5 and 6 require examination of coffee processing support activities and services;
iv. Questions 7 to 11 focus on performance of coffee marketing support activities and services

v. Questions 12 and 13 are about respondent's assessment of coffee management institutions; and
vi. Question 14 seeks opinion on strategies to improve the SCM in coffee industry.

b) Questionnaire for Farmers

Likewise, the survey questionnaire designed for farmers only (see Appendix II) has all the mandatory research items. The set has a total of 6 main sections as follows:

i. Section 1 requires respondent's particulars;
ii. Section 2 is about assessment of coffee farming or production behaviour;
iii. Section 3 seeks exploration of agricultural services rendered by coffee management institutions;
iv. Section 4 focuses on determining the performance of coffee processing and handling;
v. Section 5 aims at information regarding performance of coffee marketing support services; and
vi. Section 6 is about general information and respondent's opinion regarding how to improve SCM.

4.16.2 Interview Guide/Schedule

As mentioned above, Interview schedules or guide were a companion to the researcher and research assistants during data collection. The instruments were developed in order to guidethe researcher in order to conduct a well-structured and logical interview with employers and Chief Executive Officers in various coffee management authorities and institutions. The institutions include Coffee Marketing Board, Cooperative Unions, Government Ministries, Regional and District authorities, coffee production, processing and marketing companies and authorities. The researcher found it rational to prepare these interview schedules considering that most of the targeted respondents are high rank officials the majority of whom have tight schedules and time tables. The best way therefore was to get adequate information from them through the use of structured interview guide.

This research work developed two different sets of interview schedules; namely interview schedule for executives in the coffee management institutions and interview schedule for High Level Officials in Government Ministries (see Appendix III and IV). Both interview schedules have an introductory part indicating the name of the researcher and collaborating organisation. The introduction indicates the objective of the study and assures confidentiality to the respondent. The cross section of the two schedules is as follows:

a) Interview Schedule for Coffee Management Institutions

The interview schedule designed for coffee management institutions (see Appendix III), has three sets of unstructured (open-ended) questions are as follows:

i. Set Number 1 are questions from (i) to (xi) which are designed specifically for assessing the behaviour on coffee production process and the target respondents are coffee management institutions or institutions that are facilitating coffee production support activities and services;
ii. Set Number 2 are questions from (i) to (xiii) that have been developed particularly for evaluation of coffee processing where processors is the focus group expecting to provide all dynamics encountered in attending coffee processing and handling support activities and services; and
iii. Set Number 3 are questions from (i) to (xiv) for respondents to examine, elaborate and give personal opinion regarding the performance of coffee marketing institutions.

In all the three sets of questions, respondents are not limited to specific answers, instead, are requested to give their own answers and some cases are requested to give personal suggestions in order to improve the performance of the coffee supply chain in Kagera region.

b) Interview Schedule for Officials in Government Ministries

Unlike the Interview schedule for coffee management institutions, the schedule for Government officials has a combination of open-ended questions developed in order to assess the SCM in its totality from production through processing and marketing to the end consumer. The reason for combining all aspects pertaining to coffee supply chain is from the point that the government is the overall overseer of all agricultural services in the country. Therefore, government officials have all the necessary information as they are the coordinators of all agricultural services to public and private sectors.

4.16.3 Documentary Records

Documentary records always assist in obtaining secondary data and information that serve several purposes. It provides a triangulation with questionnaire and paves the way for oral interview planning. In this study, documentary records supported the collection of secondary data and information in order to supplement primary data collected through use of interview, questionnaire and observation instruments. Among the documents that have been collected include: -

(i) Agricultural production reports;

(ii) Trade reports (imports and exports);
(iii) Budget speeches and Economic Survey;
(iv) The Tanzania Agricultural and Livestock Policy 1997;
(v) Economic bulletins by the Bank of Tanzania;
(vi) Coffee Industry Act and other documents on coffee in Tanzanian; and
(vii) research papers on agriculture from UDSM, SUA, UNISA-SBL, ESRF and REPOA.

The main sources of documentary records collected are the listed units of enquiry on section 3.14 above as all were visited by the researcher in due course of study. A library search will form part of a documentary records collection as indicated on section 3.14 above. Meanwhile, Internet facilities will be used to obtain more information. Thus, the data from questionnaire, interview schedules and documentary records will enable this study to answer the predetermined research questions and propositions and eventually will play a pivotal role in attainment of research objectives.

4.17 Methods of Data Collection

In the spirit of triangulation[11], this study employed Survey, interviews and observation as research methods for collecting the required data as follows:

4.17.1 Survey

This study applied survey as a major method of collecting data through giving or sending questionnaires to the respondents with a request to complete and return them to research assistants and or principal researcher. The method was employed mainly in the case where the respondents were of the elite and semi-educated class. The reason for selecting this method was because survey questionnaire is always simple so that the respondents can easily understand the questions and be able to answer them. District and regional agricultural officers in Kagera region eventually facilitated the identification of the prominent coffee farmers whom the researcher contacted for questionnaire filling. The respectable feature of the survey is that the questionnaire is self-administered by the respondents themselves and not by the researcher as in the case of personal interview method. It does not involve face-to-face conversation between the investigator and the respondent. Therefore, survey is less expensive as compared to interview and observation although it requires complimentarily with other methods such as interview and observation.

11 Triangulation refers to the collection of data from a variety of sources, in the use of different methods and techniques, with a variety of perspectives

4.17.2 Interview

Interview, often called “one-on-ones” unstructured or structured conversation was conducted by a researcher at the same time of questionnaire filling. Although this technique of data collection is criticised for being more expensive than focus group, however, this study considers interview as a purposeful exchange of ideas and it is an interaction between the interviewer and a respondent, which contributed so much to success of this research work. Indeed, the researcher argues that with the growing sophisticated methods of interviewing resulting from computer technology and Internet have possibly tended to downgrade the significance of the professional interviewing. Since this was in-home research; face-to-face interviews was one of the best methods of data collection. The method is traditional and outmoded by new generation of dynamic system, nevertheless, flexible and capable of collecting research data of high quality.

For this study, interviews were conducted by using questionnaires (see annexes I and II) to selected respondents from the list indicated on table 3.5. The researcher applied a detailed interview guide (see schedules annexes III and IV) during the interviews with various respondents. The designed interview guide were specific to the focused groups, that is, those questions seeking information from processors have different focus from those designed for marketing professionals likewise for the rest of the groups. The study developed two sets of interview schedules containing questions for interview with workers and executives of government ministries, interview with other coffee management institutions. Another one includes sets of questions for stakeholders in coffee production, processing and marketing. In this research work, interviews were conducted by using a structured schedule or unstructured guide sets of questions attached to this paper as annexes III and IV.

4.17.3 Observation

Observation is a research technique in which the researcher records information without relying upon respondent answers or memory. This is called non-reactive research technique widely used in scientific studies. Because it is the classical method of investigation that has several applications in the marketing research, the researcher picked it as one of the methods for data collection in this study. Although it can be used alone, this study decided to apply it in conjunction with other research methods to supplement and be rich in the data collected.

In this particular study, observation method was applied as supplementary method of primary data collection done through the use of questionnaire and interview schedules. This approach has been purposely proposed in order to acquire background information of farming systems behaviour in all areas of study especially villages in Kagera region and processing institutions and plants. Important aspects that were observed in application of this approach include the following: -

(i) Production pattern and farmers' access to various extension services related to coffee production;
(ii) The performance of institutions in provision of agricultural services to farmers as regards to coffee production, processing and marketing support activities and services;
(iii) Behaviour of farmers to adoption and application of improved farming technologies; and
(iv) Coffee processing technologies, environmental conservation, grading and packaging for marketing.

Therefore, observation enabled collection of ample information for justifying data contained in the questionnaire and an interview guide. Above all, the observation technique facilitated establishment of mutual trust to respondents for willingness to co-operate with the researcher throughout data collection exercise.

4.18 Sampling and Sample Size

As described in the theory and practice of research methodology, when conducting a research, it is almost always impossible to study the entire population that you are interested in. In this regard, was not possible to study the entire population of Kagera region. The researcher could not contact all coffee farmers in Kagera region as it could require large amount of finance, energy and time. In order to survey the proposed population, a researcher designed and adopted the use of a sample as the best way to collect the required data.

4.18.1 Sampling Method

In order to get a sample, this study applied a combination of both probability and non-probability sampling methods. In terms of probability sampling technique, the study applied the stratified sampling while on the part of non-probability sampling technique, quota sampling, purposive or judgemental sampling and snowball were employed. As indicated in the preceding sections of this paper, probability sampling is a technique in which every unit in the population has a chance to be in the sample whereas non-probability sampling is a method where some elements of the population have no equal chance of being selected or where the probability of selection cannot be accurately determined. As regards to purposive sampling

sometimes called judgemental and snowball sampling, a decision with regard to which respondent to be included or excluded in the sample rests on the researcher's judgement and intuition. In this study, the researcher used these techniques for selecting respondents who fit his specific purpose or description. That is; the selection of respondents the researcher was based on the trust, their ability and knowledge about the subject matter and these are expected to be coffee growers and individuals with ideas on application of SCM.

In selecting the respondents from government offices, crops authority offices and leader of farmers' groups, both judgmental and snowball techniques were applied. The researcher interviewed and collected data from some farmers and leaders of farmers' association he was able to locate, the rest were proposed by individuals from members of the community who have the required knowledge on coffee subsector and application of SCM. This is snowball technique of sampling. Under these techniques, usually the researcher subjectively chooses the sample from members who are believed to be knowledgeable about the topic being studied. In relation to this particular study, only the farmers and staff of the above-mentioned organisations, skilled or semi-skilled who can understand the dynamics of SCM were interviewed. These are people who are involved in management of agricultural services and are capable of expressing their opinion to the researcher. Selecting such sample of respondents increased the level of accuracy as well as responding rate.

Therefore, stratified sampling on one hand has been selected in order to set various groups of respondents including farmers, leaders of farmers' association, leaders of coffee management institutions and government officers. Purposive or judgmental and snowball sampling techniques on other hand have been selected to form a combination because the respondents in Kagera, were selected from only individuals with ability to express their opinion on co-ordination of coffee production, processing, and marketing support activities and services. This means that respondents picked were those with ability to understand the concepts of SCM in agricultural activities particularly in coffee in this region. Nevertheless, these techniques are less expensive convenient and administratively simple.

4.18.2 Sample Size

The proposed research design and sampling technique were engaged in order to determine the sample of respondents from all the districts of the Kagera region and other stakeholders' offices. Respondents or study population were selected from the following groups: -

i. Individual coffee farmers
ii. Leaders of coffee farmer groups
iii. Officers from the public and private coffee processing and marketing institutions
iv. Leaders of Co-operative unions and coffee marketing Board;
v. Regional and district agricultural officers
vi. Senior and middle Marketing, trade officers in the Government ministries,
vii. Government senior officers (Directors and Commissioners)

The sample of respondents for this study included a total of 500 individuals out of the 152,060 total target populations of the coffee producers in Kagera region and 860 from outside the region. Out of the mentioned population including 15,000 families of coffee growers, the study selected a total of 350 respondents including 150 farmers, 50 leaders of farmers' associations, 60 cooperative union workers, 30 officials in the regional government offices, 20 coffee processors and marketers, 40 middle level officers and 5 executives of other coffee management institutions. Outside Kagera region, the researcher selected 95 individuals in coffee management institutions and 50 government officials in the proposed line ministries for coffee management to be part of the sample frame[12]. Table 5 indicates the details of different strata of the sample size of the study.

Table 4.5: Breakdown of Respondents in Kagera and other Institutions

TYPE OF RESPONDENTS	KAGERA		COFFEE AUTHORITIES		GOVEMENT OFFICES		TOTAL	
	N	n	N	n	N	n	N	n
Individual Farmers	15,000*	150	-	-	-	-		150
Leaders of Farmers' Groups	300	50	-	-	-	-		50
Co-operative Unions' Workers	420	60	-	-	-	-		60
Government Officers	150	30	-	-	200	20		50
Processors and Marketers	100	20	100	40	-	-		60
Middle Level Officers	200	40	200	50	300	25		115
Executives	30	5	40	5	20	5		15
TOTALS	151,200	355	340	95	520	50	152,060	500

Source: Babbie (2007)
KEY: N –Total Population; n - Number of Respondents (Sample Size); * - Families

Thus, from Table 3.5 above, it is indicated that the study contacted a total of 500 respondents including 355, 95 and 50 respondents which is 71.0, 19.0 and 10.0 percent of the sample frame from Kagera, coffee management institutions and government ministries respectively.

12 Sample Frame is a list of target population members from which actually data is collected.

4.19 Types of Data Collected

The study collected both primary and secondary data on application of SCM in coffee production, processing and marketing support activities and services with focus to behaviour, process and institutions. While primary data was collected through questionnaire filling by individual respondents, one-to-one interviews and observations, secondary data was collected through documentary records. In respect to the conceptual framework, the data collected contained information that enabled a researcher to make analysis of the model of application of SCM in terms of behaviour, process and institutions involved in the production, processing and marketing of coffee in Kagera region. During this exercise, time series (the data that is collected over a period of time) type of data was collected.

4.19.1 Production

With regardto production, the main thrust was placed on collection of data related to farming behaviour. The study attempted to find out whether small- or large-scale farming is practised and which one is the best option for Kagera region. The researcher through questionnaire forms sought to assess if under the current SCM model, farming behaviour the volume of production increases, constant or decreases. The main aim was to examine the trend of volume of production in relation to agricultural services provided to farmers such as extension services, research and development, training, input supply (machinery, fertilisers and seeds). Other areas include disease control, financial and credit services system to farmers, the culture of introducing new technologies and improved packages as well as operations of dissemination of early warning information services to farmers.

In addition, the researcher assessed the amount of funds provided by the government for production in terms of input supply, extension services, new technologies, irrigation facilities, capacity building (human and physical), research and development and rural credit schemes. Designed questionnaire clearly reflected all these aspects and opinions of the farmers and workers in the government and crop authorities were expected to provide clarifications and documentary records. Assessment of institutions participating in input supply, provision of extension services, research and training also was focused.

4.19.2 Processing

In the area of processing, the study focused on the data collection regarding the application of SCM in handling (transport and storing), and other agro-processing. Specific areas of investigation included: -

(i) Status or level of coffee processing technology;
(ii) Mode and availability of transport and handling of coffee;
(iii) Types and efficiency of coffee processing industries and plants;
(iv) Coffee quality control and inspections services throughout the supply chain;
(v) Coffee packaging and marketing support activities and services; and
(vi) Environmental conservation, use of chemicals and recycling.

In general, the study sought to examine how coffee is processed for market and better producer price. In so doing, the study assessed the amount of post harvest losses and amount of funds set for agricultural infrastructure such as transport, storage facilities, types and level of agro-processing technology. Others are packaging, quality control services, application of chemicals and recycling issues. As indicated above, the study sought the opinion of the respondents on the best strategies for improving coffee processing. Data on processing included the assessment of institutions participating in coffee hulling[13]/curing and other handling support activities and services.

4.19.3 Marketing

In the area of marketing, the main aspects that were investigated were provision of marketing facilities and information to farmers, price determination, performance of co-operative unions and coffee marketing board, contribution of coffee to farmers and regional agricultural GDP, status of rural-urban roads transport and other telecommunication services. Another crucial area of study in marketing included examination of services provided by marketing and financial institutions such as commercial banks, long-term development financial institutions, savings and credit societies as well as agricultural banks. Information on their structures and the way they determine price for coffee was also targeted. The researcher collected data on credit facilities available to farmers and terms attached to such facilities as well as participation of marketing in the whole coffee supply chain.

4.20 Data Processing, Analysis and Presentation of Results

4.20.1 Data Processing and Analysis

The collected data was recorded in the excel spreadsheet of the windows computer software, descriptively summarised, organised and interpreted (descriptive and inferential statistics). The researcher employed

13 **Hulling-** refers to remove the outer rind or shell from a coffee cherries, it also apply to fruits and vegetables

Statistical Package for the Social Science known as SPSS for analysing the collected data. The researcher opted for SPSS because it offers marketing researches and other analysts a considerable and flexible means of analysing data. It is argued that the use of SPSS for marketing research has increased because of its accuracy in the usage of an open database. From the foregoing, SPSS and excel are viewed as software packages that offer data processing services spreadsheet of varying levels.

Thus in this study, SPSS and excel have been employed for coding and tabulation of data from questionnaire and analyse it for drawing conclusions and preparation of graphs (Bar and pie charts). Since coding of answers from the questionnaire is a very delicate and sensitive activity, the researcher undertook this activity independently so as to produce quality results. Tabulation was conducted in order to prepare quantitative data so that it is readily understandable. This entailed counting frequency of certain cases within classifications relevant to this particular survey.

4.20.2 Presentation of Findings

Texts, tables and graphs have been constructed to support the facts. Qualitative and simple quantitative analysis in terms of statistics and interpretation supplemented the presentation of findings whereby tables and graphs were also qualitatively interpreted. Interpretation of findings of the surveyed data is a matter where scholars express strong conflicting views and ideas. While other scholars would like that researchers give their own interpretation of the findings of the surveys, others are equally dogmatic, sticking to the view that researchers should limit themselves to reporting the facts discovered only. The researcher trusts that whatever the nature of data, the task of interpretation of such data falls on his shoulders. During this research work, the researcher sought to provide interpretation and opinion. At the end of the research report there are a number of attachments (annexes) to support and facilitate understanding of the facts. This type of analysis (descriptive) and presentation were proposed because they are understandable to most of stakeholders of the agricultural sector in Tanzania.

Regarding qualitative presentation of findings, the researcher kept in mind the major classes of readers. Thus, this research report has been organised in a language and style that is understood by all stakeholders (majority rural Tanzanians). Descriptive analysis was adopted for simplicity to achieve the objectives of the study. Essentially, for triangulation purposes, a combination of qualitative and quantitative methods were applied in the presentation of findings.This study enabled the researcher to improve the accuracy of conclusions by relying on data from more than one method. This process is described as

'corroboration'[14]. Another reason for applying this method of presentation was to allow one type of data to elaborate the findings of the other so as to offer richness and details.

4.20 Limitations

The study was conducted in Kagera region where it encountered a number of constraints and limiting factors. SCM is an area which some rural coffee farmers are not conversant with its concepts. This made the researcher spend extra time to explain the subject where it seemed difficult to some respondents.. Research assistants ensured that all questions were well understood for the respondents to provide appropriate answers. In some cases respondents provided guess answers when they did not understand the subject. Nevertheless, the approach of using the judgmental sampling and snowball sampling for obtaining a sample basing on the respondents' desired skills on the subject under study increased the degree of accuracy. In addition, the observation method helped confirm answers provided by some respondents. The study also encountered transport challenges and poor infrastructure in rural areas of Kagera region. The researcher hired private transport to ensure mobility throughout the data collection exercise. The technical language together with other agribusiness terminologies applied in the questionnaire forms also posed a limit of understanding to some respondents. The researcher and research assistants took full responsibility to interpret and elaborate all questions to respondents who needed immediate attention so as to ensure accurate responses.

4.21 Conclusion

This study conducted data collection exercise as it was planned in the research proposal. The research methods involved survey, interview, documentary record collection and observation were. The proposed instruments of data collection were questionnaires, interview guides and observation schedules. The study employed the sampling techniques and strategies as well as data processing, analysis and presentation of findings as planed. The proposed units of enquiry were visited while all the types of data proposed were collected according the predetermined research proposal. The principal researcher and research assistants addressed limitations accordingly thus mitigating any effect to the study findings.

14 Corroboration refers to addition of strength, confirming, attestation or something presented in support of the truth or accuracy of a claim. In other words it is an evidence that tends to support a proposition that is already supported by initial evidence therefore confirming.

CHAPTER FIVE

RESEARCH FINDINGS

5.1 Introduction

Chapter Four presented theory and practice of the research methodology as well as the the methodology adopted in undertaking this study. It described the the types of research methods and research designs, sampling and data collection techniques, instruments of data collection and analysis. It finally explained the data collection design, presentation and units of inquiry.

This chapter presents findings about descriptive and empirical information of basic agricultural support activities along the supply chain from production through consumption. It involves the assessment of production, processing and marketing support activities so as to examine their influence on production and productivity of coffee in the Kagera region. In view of the Research Proposal for this study, the selected research methods and instruments facilitated collection of data in order to respond to the pre-determined research questions, specific research objectives, research propositions as guided by the conceptual framework. The overall objective is to determine the application of an appropriate SCM conceptual model in the coffee industry in Tanzania using case of Kagera.

The research methods and instruments applied for data collection were based on a case tudy approach. The sduty employed use of questionnaires, interviews, documentary records and observation to collect both primary and secondary data. This study had a purposive sample of 510 respondents out of the total population of Kagera region that is 152,060 people. From 510 respondents 270 were farmers and 240 were workers[15] in the government ministries, coffee processing and management authorities. Four research assistants participated in the data collection process that involved processors[16], government executives[17] and chief executive officers of various coffee management authorities.

Observation facilitated collection of qualitative data from coffee factories, farms and offices. It was very useful in witnessing the performance of coffee curing factories, instant coffee plants and general coffee management in Kagera region. Compilation of documentary records helped obtain empirical data. The

15The term workers includes employees in the government and other crop authorities (crop boards and co-operative unions)

16The term processors include workers in coffee curing factories, and private coffee processing companies.

17The term Executives includes Permanent Secretaries, Directors and Commissioners of ministries, Chairpersons and Managing Directors in the co-operative unions and crop boards

collected data were descriptively summarized through SPSS .The exercise of data collection is summarised in Table 5.1:

Table 5.1: Summary of Exercise of Data Collection and Analysis

RESEARCH ITEM	DESCRIPTION
Subject of Study	An Appropriate Conceptual SCMM in the Agricultural Sector: A Case of Coffee in the Kagera Region
Research Design	Case Study
Geographical area	Kagera region, TCB Head Quarters (Moshi), MAFSC, MIT, and MOF (Dar es Salaam)
Sample size	500 respondents (farmers, processors, marketers and government officials)
Sampling technique	Probability and non-probability techniques (Judgemental and Quota sampling)
Instruments of data collection	Questionnaire, Interview and observation schedules and documentary records
Methods of Data Collection	Survey, interview, observations and documentary records collection
Programme of analysis	Statistical Package for Social Science (SPSS) and Excel
Analysis performed	Qualitative and Quantitative analysis

Source: Author's Construction, 2014

5.2 Coffee Production

This section presents the findings about the application of SCM in the coffee production process in Kagera region. It assesses the opinion of the farmers, leaders of farmers' associations and government workers on the application of SCM. It alos presents findings of the opinion of the respondents on various agricultural services to coffee production. Data analysis has been organised by beginning with analysis of the production pattern of coffee in Kagera region followed by the analysis of different production services (activities) to determine the degree of the application of SCM. The challenges facing production coffee services and corresponding respondents' opinions are listed and discussed.

5.2.1 Coffee Production Pattern

The general view of coffee production categories of farm sizes was examined through Question No. 2 of the questionnaire for farmers only (Appendix II) and the results are summarised in Table 5.2:

Table 5.2: Categories of farm sizes (Acreage) for each farmer

Farm Sizes (Acres)	Total Land	Cultivated all Crops	Land for Coffee Only
0.5-3.9	30 (44.0)	30 (44.0)	51 (75.0)
4.0-6.9	16 (24.0)	20 (29.0)	13 (19.0)
7.0-9.9	11 (16.0)	10 (15.0)	2 (3.0)
10.0-12.9	7 (10.0)	5 (7.0)	1 (2.0)
13.0-19.9	2 (3.0)	1 (2.0)	1(2.0)
20.0 and above	2 (3.0)	2 (3.0)	-
Total	**68 (100.0)**	**68 (100.0)**	**68 (100.0)**

Source: Study Findings, 2014

The study findings in Table 5.2 suggests that 44% of the respondents reported that most of the farmers owned between 0.5 and 3.9 acres of the total land while 24% of them repoted that ordinary farmers owned 4.0 to 6.9 acres of the land while 16% of them disclosed that coffee farmers in Kagera owned between 7.0 and 9.9 acres of land. Less than 20% of the total population reported that coffee farmers owned more than 10 acres of land. The general observation is that most of the coffee farmers were small holders owning less than 7 acres of coffee farms.

Question 2 of the questionnaire for Farmers and Leaders of Farmers Association (Appendix I) and question (iii) of the Interview Guide for Coffee Management Institutions (Appendix III) assessed the production pattern of coffee for the last fifteen years. Respondents were to indicate whether the coffee production pattern was of decreasing, constant or increasing nature. The findings are summarised Table 5.3.

Table 5.3: Coffee production pattern for the past fifteen years

	COFFEE AUTHORITIES		FARMERS	
PATTERN OF PRODUCTION	Respondents	**Percentage**	Respondents	**Percentage**
Increasing	35	14.6	37	13.7
Decreasing	137	57.1	166	61.5
Constant	68	28.3	67	24.8
Total Respondents	240	100.0	270	100.0

Source: Survey Findings, (2014)

Table 5.3 indicates that observed a decline in coffee productionOut of 240 staff of crop authorities 137 (equivalent to 57.1 %) felt that coffee production for the past fifteen years had been declining. Out of 270 farmers 166 felt that the production pattern for coffee had been increasing. However, 68 (28.3%) and 35 (14.6%) workers as well as 67 (24.8%) and 37 (13.7%) farmers observed constancy and increase respectively. This trend is graphically presented in Figure 5.2.

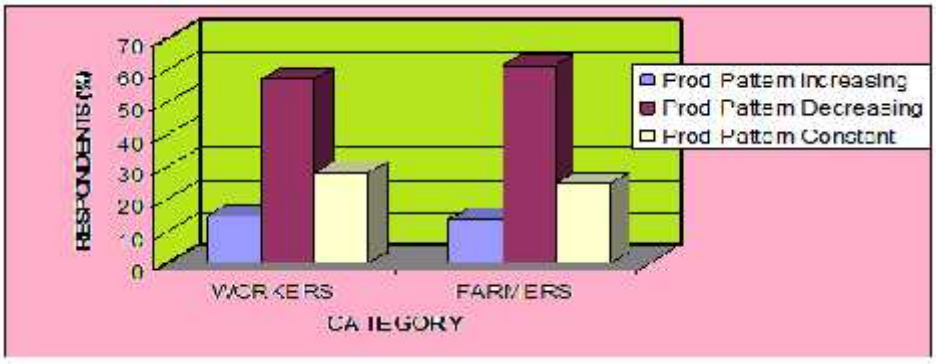

Figure 5.2: Assessment of coffee production pattern

Figure 5.2 shows that both staff of crop authorities and farmers had the same opinion that the production pattern of coffee had been declining during the past fifteen years. The minority of respondents indicated that the production pattern had been increasing.

5.2.2 Factors for Declining Coffee Production

The study conducted interviews in order to explore reasons for failure to implement SCM and reverse the trend of declining production as observed during the course of the study. The research work applied question No. 2.9 in the Questionnaire for Farmers and Leaders of Farmers' Association (Appendix I). It also applied Question X of the Interview Guide for coffee Management Institutions (Appendix III). Likewise, it sought opinions regarding factors hindering coffee production. The questions prompted respondents to raise multiple responses including those reflected in Table 5.4:-

Table 5.4: Constraints faced in facilitating coffee production

CONSTRAINT	Respondents	%of responses
Farmers' reluctance to adopt modern farming technologies	89	13.0
Lack of working tools and incentives for extension workers	138	20.2
Use of middlemen in buying crops that distorts the set-up of supply chain	82	12.0
Insufficient government budget for agricultural sector	115	16.9
Inadequate training programs to agric staff and farmers	46	6.7
Inadequate number of extension staff up village level	66	9.7
Lack of dissemination of research results to farmers	25	3.7
Poor infrastructure (roads, transport facilities and communications)	18	2.6
High costs of inputs due to abolition of subsidy	13	1.9
Political interventions in Management of coffee	25	3.7
Lack of capital for rural farmers to afford recommend farming technology	20	2.9
Poor marketing system for coffee (lack of price and market information)	13	1.9
Bureaucratic procedures applied for supply of agricultural inputs	8	1.2
Weak public-private sector linkage due to erratic policies on agricultural crops	10	1.5
Existence of three line ministries supervising agriculture	14	2.0
	Total 682	

Source: Survey Results, 2014

5.2.3 Coffee Production Services

Question 3 t of the questionnaire for Farmers and Leaders of Farmers Association (Appendix I) assessed various production activities.. The findings are summarized in Table 5.5.

Table 5.5: Assessment of coffee production services by farmers and Workers

Production Activity	FARMERS				WORKERS			
	Inadequate		Adequate		Inadequate		Adequate	
	Rspdt	Percent	**Rspdt**	Percent	**Rspdt**	Percent	**Rspdt**	Percent
Inputs supply	142	52.6	128	47.4	128	53.3	112	46.7
Research and Development	87	32.2	183	67.8	103	42.9	137	57.1
Extension Services	186	68.9	84	31.1	138	57.5	102	42.5
Financial credit facilities	246	91.1	24	8.9	196	81.7	44	18.3
Early Warning Info/Weather	199	73.7	71	26.3	100	41.7	140	58.3
Training to farmers	142	52.6	128	47.4	109	45.4	131	54.6
New Production Tech	191	70.7	79	29.3	82	34.2	158	65.8
Pests and Disease Control	145	53.7	125	46.3	100	41.7	139	57.9
Dissemination of Seeds	77	28.5	193	71.5	74	30.8	166	69.2

Source: Survey Results, (2014) **KEY: Rspdt – Number of Respondents**

Activities in Table 5.5 were ranked in the form of No services provided, Unsatisfactory, Fair, Good and Excellent with code numbers ranging from 1 to 5 respectively. Respondents were to assign only one item

among the five answers indicated above. The analysis was in two categories with codes 1 and 2 called 'Inadequate'. Categories in 3 to 5 codes were called 'Adequate'. The findings indicate that farmers were dissatisfied with the services provided to them except in terms of research and development (67.8%)and dissemination of improved seeds (71.5%). On the other hand, workers were satisfied with the provision of most of the services along the coffee supply chain except in terms of extension services (42.5%) and financial credit facilities (42.5%).

The study analysed the collected data regarding production services listed above as reflected in Table 5.5 and those in Appendices for research results number 22 to 28 generated by cross tabulation between each production service and respondents with different levels of education in order to examine the performance application of SCM in each respective variable as follows:

i. Input Supply

The assessment of supply of input activity in table 5.5 shows that 52.6% of the farmers see that this service was inadequate against 47.4% who reported that it was adequate. On the other hand, 53% of workers indicated that the input supply activity was inadequately performed while 46.7% felt that the service was adequately addressed. This assessment and others as reflected in Appendix V (22) show that the majority of non-professionals who were the majority of farmers ranked this service from No service provided and fair while 47.3 % of primary school leavers, who were mostly farmers in rural areas, ranked it as unsatisfactory. None of the post graduate and professional qualification ranked it as good. The study noted that this is because farmers have low purchasing power to buy inputs.

ii. Research and Development

Table 5.5 indicates that more than 67 % of farmers classified the research and development activity as favourably undertaken. Moreover, 57.1% of the workers indicated that it was adequate while 42.9% of workers indicated it as inadequate. However, workers in the government services and crop authorities commented that research and development had been one of the government's priorities as it had been allocating it between 15% and 30% of the agricultural public budget specifically from 1990 to 2012. This is a better consideration keeping in mind that during the same period food security and grain were allocated between 0 and 12% of the total agricultural sector budget.

iii. Extension Services

Table 5.5 reveals that 68.9% of farmers and 57.5% of workers indicated that extension services were inadequately undertaken. More than 31% farmers and and 42% of workers felt that extension services are adequately provided to coffee growers. Further analysis as expressed in Apendix V (23) of research results indicates that a total 52.6% of respondents ranked this service as unsatisfactory followed by 23.3% of them ranking it as no service provided. The findings also revealed that primary school leavers made more than 50% of each of responses. More than 66% of the respondents with post graduate education ranked this service as unsatisfactory while 75% of graduates saw it as fair.

Theinterviewed respondents indicated that among the main constrains that hinder extension staff from fulfilling their obligations include lack of working tools and incentives to extension staff. Others are inadequate number of extension workers as well as inadequate training program for agricultural staff that include extension staff. From such circumstance this activity is likely to perform below the required level and thus hinder the application of SCM.

iv. Financial and Inputs Credit Facilities

The findings in Table 5.5 indicates that a very small segment of respondents (8.9% and 18.3) from farmers and workers views the services of credit facilities as better one while a large segment (91.1% and 81.7%) of farmers and workers respectively evaluated financial services as inadequate. The findings in Appendix 24 confirm that most of respondents were mostly farmers with primary school and secondary school education .The results show that 28.9% and 22.2% of respondents with primary education ranked this facility as No-service provide and unsatisfactory respectively. Likewise, 15.9% and 7.8% of the respondents with secondary education ranked it as No service provided and unsatisfactory. There was no respondent at any level of education who indicated it as either excellent or good except 0.7% of those with diploma education who indicated it as good. More than 52% of all the farmers ranked this aspect as No service provided. It wa noted that 50% of the bachelor degree holders saw it as unsatisfactory while another 50% saw that no such service was provided to coffee farmers.

It was noted through an interview that such assessment of this activity was because most of the financial institutions were located in urban areas where there were no agricultural production activities. It was also learnt that the common requirement attached to financial credit to agriculture required a borrower to have

collateral (immovable asset) such as surveyed land and buildings. Most coffee farmers do not have such collateral that can guarantee them secure financial credits.Hence the inadequacy of input credit facilities for coffee production in Kagera region.

v. Early warning information

The study findings in Table 5.5 suggest that 26.3% of farmers and 58.3% of workers considered early warning system as adequate whereas 73.7% of farmers and 41.7% of workers confired that the services of providing early weather information were inadequate. The research results in Apendix V (25) substantiate that respondents with postgraduate level of education as well as bachelor's degree were dissatisfied with the provision of early warning information because none of them indicate it as either good or excellent. The results show that 17.0% and 24.0% of the respondents with primary education ranked it as 'no service provided' and 'un satisfactory' respectively while 7.0% and 13.0 % of respondents with secondary education placed it at 'no service provided' and 'unsatisfactory' positions as well. Only 0.7% of the diploma holders indicated it as excellent service, which is a negligible assessment.

Interviews revealed that dissemination of early warning information was through electronic media and radio. Most or all of the smallholder farmers lived in the villages where there was no power supply and did not receive radio and television services on daily basis. Worse enough, some families did not own radios. Therefore, only the minority of farmers received weather information.

vi. Training to Farmers and Agricultural Staff

The findings in Table 45.5 generally indicate that the training aspect to both farmers and personnel in the agricultural production sector was not adequately executed. About 53% of farmers and 45% of workers were not satisfied with the training service, which largely was provided by the government through various Ministry of Agriculture Training and Research Institutions (MATs). More than 47% of the farmers and about 55 of the workers ranked the aspect of training as sufficiently articulated.

The clarification made by the interviewed government executives was that the country has nine agricultural training institutes with the capacity of 1,660 students per annum. However, some of them are old [18] and unable to accommodate a big number of trainees. From 2005 to 2011 they had an average of 1070

18 The Agricultural Training Institute (MATI) Uyole in Mbeya was established in 1968 with a capacity of 500 and MATI Ukiriguru was established in 1939 with the capacity of 260 people but these institutes are not adequately rehabilitated and modernized to cope with new technological developments to meet training needs.

trainees per year. Only 2,214 agricultural staff attended long-term training. During the same period, a total of 42,137 farmers were trained countrywide whereby only 1,987 and 991 farmers attended short courses in 2011 and 2012 respectively. However, no specific data for Kagera only were obtained). In 2012 only 548 extension workers attended short courses offered at the institutes; a very negligible number of farmers and extension workers.

vii. New Production Technologies

The findings in Table 5.5 reveals an area where farmers and workers had different but opposite opinions on introduction of new production technologies to farmers. While about 71% of farmers regarded it as inadequate activity to them 65.8% of workers regarded introduction of new technologies as adequately offered to them. The further assessment of workers to this aspect indicates that more than 34% of them see it as poorly performed as 29% of farmers have the same opinion. The survey result show that a total of 18.8%, 51.9% and 26.3% of all categories of respondents with different levels of education in population sample ranked it as 'No services provided, 'unsatisfactory' and 'fairly provided' respectively. The overall assessment indicated that only 3% of respondents ranked the activity as 'Good'.

viii. Pests and Disease Control

The reported findings in Table 5.5 suggests that about 54% of the farmers in the sample had opinion that this service was inadequately provided while about 58% of workers' respondents viewed it as adequate. The activity was assessed by about 46.0% of the respondents from farmers group who indicated it as a well articulated service as opposed to 41.7% of workers who looked at it as an inadequately attended service. In addition to this, the findings presented in Annex 27 demonstrate that 15.2% of all respondents with different levels of education see that the activity does not exist in portfolio of coffee management institutions. The results further show that 41.5% of respondents have an opinion that the activity was fairly extended to farmers except to 38.5% who indicated it to be unsatisfactory. There was no respondent with Bachelor degree education who made an assessment to this activity. Both farmers and workers had no 'excellent' assessment to this aspect as well.

ix. Dissemination of Improved Coffee Seeds

The findings in Table 5.5 indicate that 71.5% of farmers and 69.2% of workers in the sample assessed it as adequate. However, 28.5% and 30.8% of farmers and workers respectively viewed it as a poorly performed activity. The general assessment indicates that this was among the few production activities that had

almost similar assessment of both farmers and workers. Annex 28 for research results also shows that about 55% of all respondents at all education levels assessed it as fairly provided services to coffee farmers. However, 0.7% ranked it as No service provided and same for excellent. 54.8% of farmers and 51% of workers ranked it as fair. There were respondents from categories with postgraduate and secondary school education that assessed this service as either No-service provided or Excellent. It was 0.7% respondents with primary education who ranked it as excellent.

Interviewed respondents indicated that there had been inadequate seed quality control and ineffective application of official regulation. They indicated that Tanzania Seed Company Ltd (TANSEED) had a monopoly of production and distribution of seeds. However, it had not been performing its duties effectively. Therefore, there was no system in place to facilitate the supply of coffee seeds to farmers.

5.2.4 Challenges Facing Coffee Production

The study used a developed Question Number 4 of the Questionnaire for Farmers and Leaders of Farmers' Association (Appendix I) requested farmers to understand the challenges facing farmers in the entire coffee production stage. Therefore, contacted respondents enumerated the constraints facing farmers in the course of production of coffee as follows:

i. Low capital base due to lack of credit facilities from financial institutions;
ii. Inadequate extension services (including lack of training) rendered to farmers;
iii. Poor marketing system and low producer prices for coffee;
iv. Un satisfactory disease and pest control system;
v. Poor farming technology applied by farmers (use of outdated farming tools such as a hoe);
vi. Poor rural infrastructure such as roads, stores, telecommunications facilities and buildings;
vii. Lack of clear focus on implementation of private sector in free market policy;
viii. Weak communication between government and farmers;
ix. Inadequate early warning information on weather;
x. Overdependence on rain fed agriculture (absence of irrigation system);
xi. High costs of inputs especially fertilizer, farm implements, seeds, machinery and insecticides;
xii. Inefficiency of crop management authorities particularly co-operative unions;
xiii. Inadequate dissemination of research results from research centres to farmers; and
xiv. Volatility of research and development activities

5.3 Coffee Processing

5.3.1 Introduction

This section examines the status of coffee processing support activities in the supply chain of the coffee to enable the study to come up with an appropriate conceptual SCMM on how Tanzania should revive coffee SCM. The section presents the findings of the analysis made on coffee processing in Kagera. It reflects the status of coffee processing and outlines the constraints facing coffee processing in this region. The primary and secondary data are descriptively presented and discussed. The section attempts to achieve the objective of evaluating the application of Chain Management in the coffee processing activities in Kagera. Thus, the section through the questionnaire assesses the opinion of the processors including workers in coffee curing factories, buyers of crops such as cooperatives and private companies. Furthermore, the study interviewed workers in government and other coffee management authorities. The study is guided by the proposition that "coffee production, processing and marketing support activities in Tanzania, are not linked so as to allow application of SCM". Tables, graphs, calculations, interpretations and discussion are used to present research findings.

Empirical results are presented in three different areas namely post harvest losses, major activities of agro-processing and major challenges facing coffee processing in Kagera. Post harvest losses are evaluated in order to find out if coffee processing is taking place adequately to avoid too much waste of coffee products. Evaluation of major services of coffee processing is done in order to examine application of chain management in coffee processing. The section presents a list of challenges facing coffee processing.

5.3.2 Evaluation of post-harvest losses in coffee

For this study to trace the adequacy of application of SCM and coffee processing, through Question (iii) of the interview guide for coffee Management Institutions (Appendix III), the researcher requested respondents to evaluate the trend of post-harvest loss by indicating whether it decreased, was constant or increased. The responses are summarized in Table 5.6 and Figure 5.3.

Table 5.6: The trend of coffee post harvest losses

TYPE OF RESPONSE	Respondents	%	Valid %	Cumulative %
Increasing	48	20.0	20.0	20.0
Constant	87	36.3	36.3	56.3
Decreasing	69	28.8	28.8	85.0
No post harvest losses	36	15.0	15.0	100.0
Total	**240**	**100.0**	**100.0**	

Source: Survey Results, 2014

Table 5.6 and Figure 5.3 indicate that 48 (20%) out of 240 respondents viewed that post-harvest losses had increased in the past fifteen years while 87 (36.3%) observed that it was constant. However, 69 (28.8%) saw it as decreasing and 36 equivalent to 15% maintained that there was no post harvest losses at all in coffee.

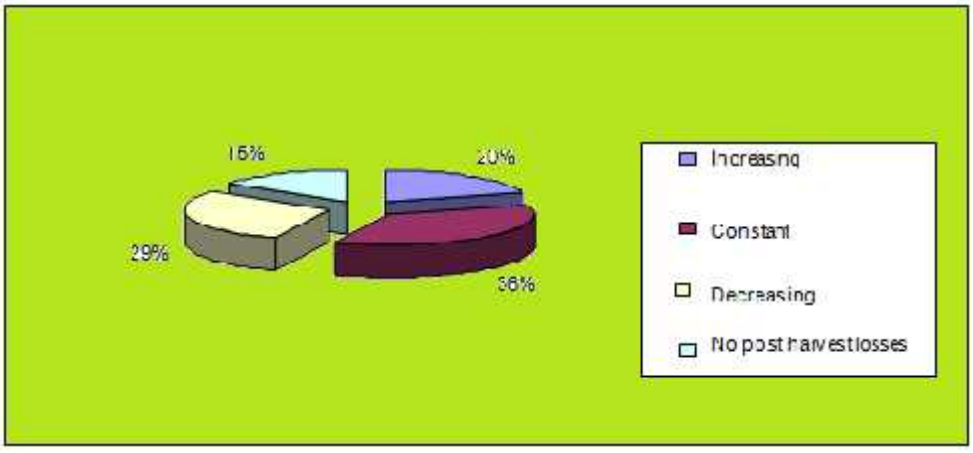

Figure 5.3: The Trend of Coffee Post Harvest Losses

From the findings in Table 5.6, respondents saw that post harvest loss in coffee lied between decrease and constancy. While 20% of the respondents saw it as increasing, about 44% consideed it as decreasing or having no changes at all. Through the interview, respondents observed that it was normal for any agricultural product to experience post harvest losses. The study noted that coffee processing had improved in Kagera,was among the factors for decrease in post-harvest loss. Respondents confirmed that

before 1988 there were only two coffee processing plants, one in Moshi and the other one in Kagera. Currently, however, there are 16 plants with a total capacity of 71.9 tons/hour.

5.3.3 Coffee Processing in the Supply Chain

This study aimed at identifying specific area of application of SCM that hindered adequate coffee processing. Farmers were to indicate whether there was an appropriate application of SCM in linking agro-processing along the whole coffee supply chain.This was through question No.6 of interview schedules for Workers and Government Ministries (Appendix IV) and the category of processors in question (xi) as well as Question number 5 of the Questionnaire for Farmers and Leaders of Farmers Association (Appendix I). The assessment of the level of application of SCM in coffee processing was done by listing down major activities in processing. The study asked respondents to evaluate services by ranking them to indicate the status of application of SCM. They were required to indicate only one among the five levels namely, No service provided, Unsatisfactory, fair, good and excellent. The results are summarised in Table 5.7(a) and 5.7(b) here under:

Table 5.7(a): Workers Evaluation of Coffee Processing Services

TYPE OF ACTIVITY	Evaluation Responses (%)					
	Excellent	Good	Fair	Unsatisfactory	No services	TOTAL
Storage and fumigation	1.7	11.3	30.0	42.9	14.2	100
Quality Control and grading	2.9	5.0	24.6	48.3	19.2	100
Technology of Processing	1.3	5.8	50.8	34.6	7.5	100
Packaging	3.3	16.3	22.9	41.3	16.3	100
Recycling	1.7	14.2	27.9	36.7	19.6	100

Source: Survey Results, 2014

Table 5.7(b): Processors Evaluation of Coffee Processing Services

TYPE OF ACTIVITY	Evaluation Responses (%)					
	Excellent	Good	Fair	Unsatisfactory	No services	TOTAL
Storage and fumigation	0.00	5.9	61.9	20.4	11.9	100
Quality Control and grading	0.00	12.2	49.3	23.7	14.8	100
Technology of Processing	0.7	10.4	48.9	33.3	6.7	100
Packaging	0.00	36.3	43.7	20.0	0.00	100
Recycling	2.2	11.5	31.5	28.5	26.3	100

Source: Survey Results, 2014

Tables 5.7(a) and 5.7(b) are summarised and graphically presented in Figure 5.4(a) and 5.4(b).

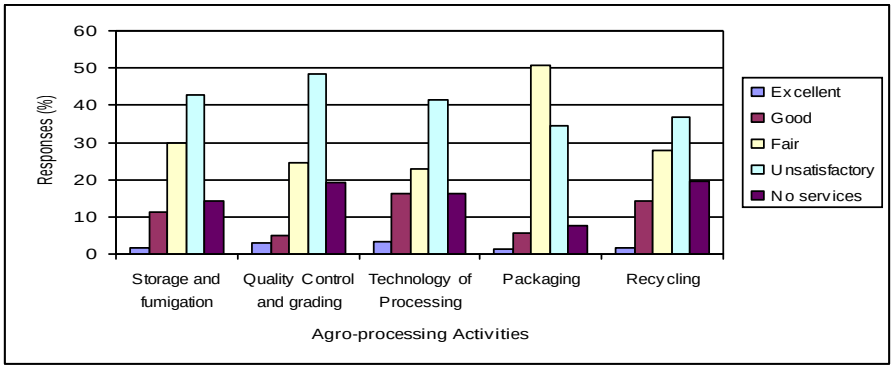

Figure 5.4a: Evaluation of Coffee-Processing Services by Workers

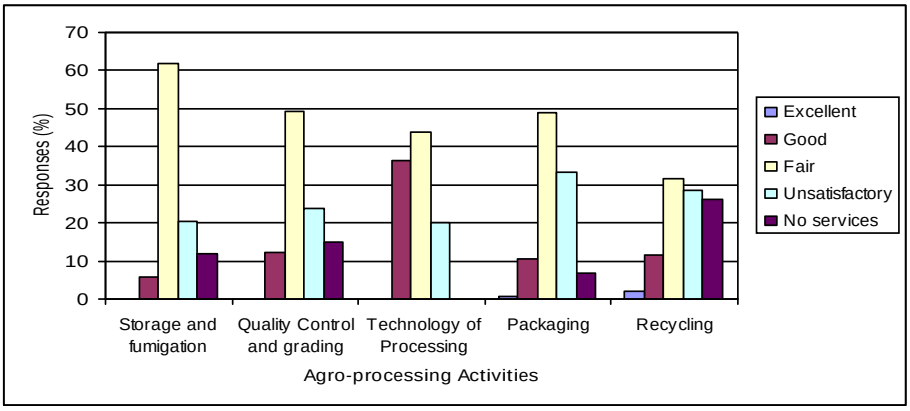

Figure 5.4b: Evaluation of Coffee Processing Services by Processors

The findings in Figures 5.4(a) and 5.4(b) show that the two sets of categories of respondents had opposite opinions on most of the activities of agro-processing. While employees in the processing sector (here called processors) saw that processing activities were fairly conducted, employees in government services (here called workers) and other coffee authorities believed that such activities were unsatisfactorily performed except in packaging where both groups felt that it was fairly done. Both groups also had the opinion that recycling processwas not adequately done. Inadquate recycling was said to be poorly done in most of coffee processing plants, causing a lot of wastes. The summary of the evaluation is presented in Table 5.8:

Table 5.8: Adequacy in Execution of coffee Processing Services

Production Activity	PROCESSORS				WORKERS			
	Inadequate		Adequate		Inadequate		Adequate	
	Rspndt	%	Rspndt	%	Rspndt	%	Rspndt	%
Storage and fumigation	81	32.4	169	67.6	137	57.1	103	42.9
Quality control and grading	96	38.4	154	61.6	162	67.5	78	32.5
Technology of processing	100	40.0	150	60.0	101	42.1	139	57.9
Packaging	50	20.0	200	80.0	138	57.5	102	42.5
Recycling of products	137	54.8	113	45.2	135	56.3	105	43.8

Source: Survey Results, (2014) KEY: Rspndt – Number of Respondents

Table 5.8 indicates clearly that processing of coffee in Kagera has increased enormously. More than 60% of the respondents in processors category and 44% of workers ranked agro-processing activities as adequate. Only 54.8% and 56.3% of processors and workers respectively ranked recycling of waste materials as inadequate. This indicates that both samples of respondents were not satisfied with recycling in coffee. Most respondents were satisfied with the level of most of the processing activities, which is an indication that most of coffee processing services are well linked along the CSC thereby confirming adequate application of SCM the .

5.3.4 Key Coffee Processing Functions

In order to evaluate the application of SCM in coffee processing, the study analysed views between processors and workers as contained in Table 5.8 above. The findings of the evaluation are as described below:

i. Storage and Fumigation

The study findings indicate that about 43% of total workers said storage facilities and fumigation was unsatisfactory. None of the respondents from the top management saw it as excellent or good. Only a negligible segment of workers (2.5% of supervisors and 1.8% of middle officers) considered it excellent..

While a total of about 62% of processors ranked storage and fumigation as satisfactory, only 5.9% of them ranked it as good and none of them saw it as excellent. However, the great portion of respondents (more

than 57%) was unskilled number of casual labourers in factories. None of degree holders and postgraduate students as well as professionals indicated it to be either good or excellent

The interviewed executives in the government and crop authorities indicated that they were not satisfied by the current level of provision of storage and fumigation services. In addition, they indicated that one of the main constraints in coffee processing was lack of effective agricultural policies focusing on rural infrastructure (roads, buildings, storage, telecommunication, water supply, market centres and electrification).

i. Coffee Quality Control and Grading

As regards to coffee quality control, the findings indicate that 48% of the workers in the government (supervisors and middle level officers) saw the activity as unsatisfactory. The results suggest that less than 5% of each segment of respondents in the sample indicated that the activity was excellent. Less than 10% of them ranked it as good while 30% of the top management team believed that the activity was not done at all and the same percentage believed it existed though unsatisfactorily performed.

The overall evaluation of processors ranked the quality control and grading as satisfactory. The results indicate that 75% of bachelor's degree holders ranked it satisfactory while 25% ranked it unsatisfactory. Likewise, 67% and 33% with postgraduate qualifications ranked it satisfactory and unsatisfactory respectively. None of skilled processors saw it as good, excellent or dormant.

ii. Modern Coffee Processing Technology

The research findings show that all categories of workers seem to have a common understanding about the application of modern technology in processing. About 50% of each segment of workers in the government and crop authorities indicated that processing of coffee fairly applied modern technology. About a half of middle officers, 47% of supervisors and 60% of top management team, ranked it as a fair activity. Less than 10 percent of the respondents in these categoriesranked it as dormant whereas less than 5% of each category it as excellent.

About 50% of processors of each category of level of education were satisfied with the application of modern technology in processing coffee. None of the respondents with university education indicated processing as good as all categories indicated it as non-excellent

iii. Coffee Packaging and Branding

A half of the 34% of the supervisors indicated that coffee packaging was unsatisfactory. However, 30% of the top management team ranked it as fair. The same was the opinion of 14% and 26% of the supervisors and middle officers respectively. The study findings indicate that about 22% of the top management also ranked it as good while less than five percent of all respondents ranked it as excellent. The findings show that the overall evaluation lied on satisfactory level.about 20% of the respondents ranked packaging as unsatisfactory, 44% as satisfactory and 36% as good. The opinions of these respondents who are semi skilled class seem to be highly influenced by lack of education. However, 50% of degree holders and 33% of postgraduate or professionals ranked this activity as satisfactory

The study found that 80% of processors and 42.5% of workers felt that the packaging activity, which is mostly done in collaboration between processors and exporters, was adequately performed. This matches well with the reality governing business under the current situation of globalisation. Public and private exporting companies are working hard to improve packaging of products to fetch better prices at the market. Executives contacted for interviews highlighted that packaging materials and food additives, the most important inputs in processing, are scarce and when available, are sold at high prices.

iv. Recycling of Coffee Residual Materials

The study found that 54% of the top management officials, 52% of supervisors and 60% of the middle class officers ranked recycling activities below fair level. Generally, according to workers, the activity seems to operate below satisfactory level. 67% of respondents with postgraduate education ranked it as non-existent. However, 33% of them evaluated it as good. More than 75% of respondents with a bachelor's degree noun ranked it as non-existent and 25% saw it as unsatisfactory. Furthermore, respondents who were diploma holders observed that the activity was neither good nor excellent. The general observation ranked the recycling process below fair thus indicating bad performance of the treatment of residual materials.Practically, coffee farmers do not utilise their own waste products to make such farm inputs as manure. The researcher witnessed burning of coffee cherries near the coffee curing factory in Bukoba and Karagwe districts. According to interviewed respondents, farmers always burn coffee cherries from the fear that they contain diseases and pests that would attack coffee plants in their farms if they used them as fertilisers.

5.3.5 Challenges in Coffee Processing

The study applied Question number 6 of the Questionnaire for Farmers and Leaders of the Farmers' Association (Appendix I), Question No. 4 of the Interview Guide for Workers in the Government Ministries (Appendix IV) and Question XII of Interview Guide for Coffee Management Institutions (Appendix III) to identify the constraints facing coffee processing services. Hence, respondents were asked for enumeration of those they consider to be constraints they face in processing coffee to show factors, which affect application of SCM to facilitate coffee processing.

The received total of 756 responses (equivalent to 100%) are summarised in Table 5.9.

Table 5.9: Factors Affecting Coffee Processing

FACTOR	Respondents	%of Responses
Lack of credit support and capital for coffee processing	162	21.4
Use of poor technology for processing and grading	117	15.5
Absence of power supply in rural areas	132	17.5
Lack of farmers sensitization for primary processing	108	14.3
Poor implementation of liberalization of agribusiness	14	1.9
Reluctance of government to spearhead value adding	28	3.7
Low prices offered to processed coffee products	39	5.2
High costs of processing materials and equipment	37	4.9
No specific body to oversee quality of coffee products	28	3.7
Inadequate technical or skilled personnel on coffee processing	23	3.0
Transport problem from farms to factories and weak infrastructure	37	4.9
Volatile investments in coffee processing by private sector	31	4.1
TOTAL	756	100

Source: Survey Results, 2014

The challenges facing processing of coffee are as outlined in Table No. 5.9. However, the interviewed respondents reported that these challenges do not completely undermine efforts improving processing of coffee. Farmers in rural areas reported that they use traditional methods to undertake primary processing of the coffee due to lack of capital for purchasing modern equipment as well as absence of power supply in their areas.

Similarly, it was established through interview that on average in Kagera post harvest losses in coffee is estimated at 15% due to various factors including lack of timely processing facilities. It was further established that processing of coffee in Kagera has improved as compared to ten years previously following re-introduction of free market system in agri-business. The constraints facing agro-processing are all internal such they that they can be arrested with time. Further assessment of agro-processing activities made indicated that on average, while processors are encouraged by the current pace of growth of processing, workers in government services and crop authorities are not satisfied with the level of coffee processing. However, it was further established that the assessment of processors was not influenced by their level of education except the factor of technology of processing applied in coffee. The responses made by workers were basically influenced by their positions in their organisations and was not a matter of chance or a reflection of reality. The analysis also revealed that the negative attitude indicated by workers was due to the fact that those activities are currently undertaken by the private sector following the introduction of market liberalisation policy.

5.4 Coffee Marketing

5.4.1 Introduction

This section highlights coffee (Arabica[19] and Robusta[20]) marketing with focus onKagera region. It underscores the success and constraints facing coffee marketing supply chain in the region. The objective is to find out whether institutions involved in crop management employ Chain Management in coordinating marketing of coffee to provide mandatory services. Thus, the study is guided by two propositions that "Marketing services are not integrated to enhance coffee marketing in Tanzania" and "Institutions responsible for coffee in Tanzania do not provide mandatory services to enable farmers to undertake production, processing and marketing of coffee".

Another purpose for this section is to review the marketing services rendered by marketing channels to deliver coffee from producers to consumers. Thus, the section draws particular attention to marketing institutions because they enable farmers to interact with the rest of the world in their economic realisation to satisfy consumer needs. Thus, the research results from collected data have been organised in three different areas namely coffee price determination, coffee marketing institutions, and marketing services.

[19] *Arabica* (*Coffea Arabica*), is grown in semitropical climates near the equator, both in the western and eastern hemispheres. The ripe Arabica cherries fall to the ground and spoil, they must be monitored and picked.

[20] *Robusta* (*Coffea canephora*) is grown in the eastern hemisphere, also in equatorial climates. Their cherries remain on the tree after they ripen. Robusta beans have twice the caffeine of Arabica.

Coffee price is investigated because it is among the major factors influencing production, processing and marketing of coffee while marketing channels or institutions are highly involved in price determination. In addition the section is analysing different marketing services (functions) so as to determine the degree of application of SCM and the research results on these services are presented one after another. Challenges facing marketing of coffee and opinions suggested by respondents are also presented.

5.4.2 Assessment of Coffee Marketing Institutions

Through Question No. 5.3 of the Questionnaire for Farmers only (Appendix II), the study wanted to identify the marketing channels that have been engaged in buying Coffee from growers and respondents were invited to indicate them by names. The findings of the study show that there are three marketing channels for coffee in Kagera region prior to Moshi international auction. The channels include primary societies on behalf of co-operative unions, Tanzania Coffee Growers Association and private dealers. Coffee is sold in a form of un hulled hard coffee (dry cherry) to Karagwe District Co-operative Union (KDCU), Kagera Co-operative Union (KCU), private companies and individual traders except coffee from estates which is marketed through the Tanzania Coffee Growers Association (TCGA). The results further show that the main functions of the primary societies in Kagera are to collect coffee from farmers, store it, and carry out preliminary grading, maintenance of nurseries, farms, central pulpier and deliver the purchased coffee to respective co-operative unions. Functions of the co-operative unions include transportation of coffee stored by primary societies to processing factories and secure bank credit facilities to purchase coffee and necessary farm inputs.

The study conducted interview with respondents and found that before the current free market system, all the produced coffee had to pass through the primary societies which were the only marketing channels wholly controlled by the co-operative unions. The unions had the responsibility of making advance payments to farmers and paying the curing charges, transportation and other incidental expenses to enable the coffee reach the destinations. Private sector was not allowed in coffee marketing activities in order to ensure that all the surplus income accrued after export is passed back to the farmers through their unions as second payments. The study revealed that coffee marketing institutions faced a number of challenges. Through question number 12 of the Interview Guide for Workers in the Government Ministries (Appendix IV) respondents were requested to enumerate challenges facing coffee marketing institutions. Table 5.10 presents the list of the challenges that are facing the coffee management institutions of which in turn lead to their failures to deliver their mandatory functions.

Table 5.10: Challenges Facing Coffee Marketing Institutions

Constraints	YES		NO	
	Rspndt	%	Rspndt	%
Weak capital base due to poor financial services	37	54.0	31	46.0
Lack of price information	56	82.0	12	18.0
Lack of farmers participation in price determination	60	88.0	8	12.0
Buying of poor (semi or unprocessed) products	52	77.0	16	24.0
Poor marketing infrastructure	38	56.0	30	44.0

Source: Study Findings, 2014 KEY: Rspndt – Number of Respondents

From Table 5.10, in each proposed challenge, more than 50% of respondents said YES, indicating that all those constraints were truly acting as a stumbling block against the performance of cooperative unions and Coffee Marketing Board while less that 47% of respondents said No for existence of each proposed challenge. Results further show that 88% of respondents had the opinion that Non farmers participation in coffee price determination was the leading challenge facing these coffee management institutions followed by lack of price information (82% of respondents) and buying of unprocessed products (77% of respondents).

5.4.3 Coffee Price Determination

In order to examine how market channels determine price of coffee and whether all key players in coffee production are involved in price determination, the study through Question 8 of Questionnaire for Farmers and Leaders of Farmers' Association (Appendix I), Question (i) and (ii) of Interview Guide for coffee Management Institutions (Appendix III) as well as Question 6 and 8 of the interview Guide for Workers in Government Ministries (Appendix IV), established that the main marketing channels in Kagera are co-operative unions and private companies.

The study indicates that the respondents' views are in three different perceptions as reflected in Table 5.11. The first segment comprising 62.2% of respondent said the prices of coffee was determined (in fact are dictated) by market channels only regardless of whether they are public or private institutions. This indicates that there is no key stakeholders (including farmers) participation in the process of coffee price determination. Thus, 22.6% of respondents observed that prices for coffee are set by the government

through co-operative unions and TCB which they think should not be coordinating marketing of coffee. Instead, it should oversee the entire coffee supply chain. Another segment of 15.5% of respondent argues that the prices for coffee are as per world market. The survey findings are hereby presented in Table 5.11:

Table 5.11: Determination of Price for Coffee

Description	**Mode by which market channels determine price of coffee**			**Total**
	Prices are set by buyers only	Prices are set by Govt through Tanzania Coffee Board	Prices are set by the World Market	
No. of Respondents	99	35	25	159
%	62.2	22.6	15.5	100.0

Source: Study Results, 2014

The assessment of the study (see Table 5.11) through interview revealed that although farmers are the key stakeholders in the coffee supply chain, they are not involved in price determination because they are ignorant of the liberalised marketing system of coffee market. The coffee marketing is still grabbed by the ideas of monopoly due to centrally planned economy that existed in Tanzania since independence in 1961 up to 1985. Face to face interview revealed that most of them just sell their crop in order to feed their families and pay taxes such as development levies.

The study further investigated the effects of price on coffee marketing in Kagera through Question number 9 of questionnaire for farmers and leaders of farmers' association. The summary of the enumerated effects of price on coffee marketing are presented in Table 5.12:

Table 5.12: Effects of Price on Coffee Marketing

Type of Effect	Respondents	% of Responses	% of Cases
Declining of production due to low Price for coffee	152	32.7	56.3
Smuggling at borders and government lose taxes	86	18.5	31.9
Shifting to growing other cash crops e.g. Vanilla	93	20.0	34.4
Increasing of rural-urban migration among youths	25	5.4	9.3
Selling of poor quality (unprocessed) coffee	38	8.2	14.1
Persistent poverty among rural farmers	36	7.7	13.3
Poor performance of co-operative unions	35	7.5	13.0
Totals	465	100	172.2

Source: Study Findings, 2014

From Table 5.12, respondents indicated seven consequences that have been experienced for about two decades now. The biggest effect observed by 56.3% of farmers in the sample frame is the decline of volume of coffee production that lead to Shifting to growing other cash crops such as Vanilla which was proposed by 34.4% of the respondents. Respondents argued that price has influence on production, processing and marketing. In this context, it is important that producers have the right information and perception about prices of their produce so that their decision on production, processing and marketing is of an informed choice.

5.4.4 Coffee Marketing Support Services

This research work assessed each marketing support service for coffee. The services were listed and respondents were requested to rank among the five categories of No service provided, unsatisfactory, fair, good and excellent. The ranking depended on how a respondent observed the provision of such service by marketing institutions in Kagera. The assessment was done through Question No. 10 of the Questionnaire for Farmers and Leaders of Farmers' Association (Appendix I). The assessment results by marketers[21] and farmers are summarised in Table 5.13(a) and 5.13(b):-

Table 5.13(a): Marketers Assessment on Coffee Marketing Support Services

MARKETING ACTIVITY	Assessment Responses (%)					
	Excellent	Good	Fair	Unsatisfactory	No services	TOTAL
Marketing information	2.1	10.0	33.8	28.8	25.4	100
Marketing credit facilities	5.0	28.8	27.5	20.8	17.9	100
Buying of coffee	2.1	5.0	30.4	44.6	17.9	100
Transportation facilities	1.7	10.8	40.8	42.1	4.6	100
Communication services	0.4	16.7	25.8	29.6	27.5	100
Average	2.26	14.26	31.66	33.18	18.66	100

Source: Survey Results, (2014)

Research results presented in Table 5.13(a) indicate that an average of 33.18% of respondents from the category of marketers had the opinion that overall marketing activities were unsatisfactory. A total of 51.84% of respondents indicated that the services were either unsatisfactory or not provided at all. The highest dissatisfaction was manifested on marketing and price information (54.2%), buying of crops

[21] Marketers refers to all staff in the institutions rendering marketing services visited by this study

(62.5%) and telecommunication services (57.1%). No activity ranked above five percent as excellent. The assessment is graphically presented in Figure 5.5(a) below: -

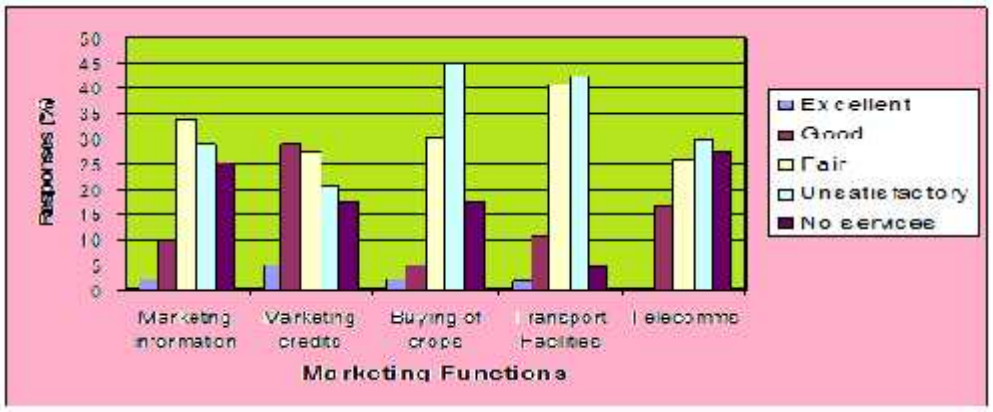

Figure 5.5(a): Marketers Assessment on Coffee Marketing Support Services

Table 6.13(b): Farmers Assessment on Coffee Marketing Support Services

MARKETING ACTIVITY	Assessment Responses (%)					
	Excellent	Good	Fair	Unsatisfactory	No services	TOTAL
Marketing information	1.5	3.0	38.5	38.1	18.9	100
Marketing credit facilities	0.00	3.7	8.5	31.5	56.3	100
Buying of crops	0.00	10.7	52.2	30.4	6.7	100
Transportation facilities	0.00	5.9	55.2	35.2	3.7	100
Telecommunication services	1.9	8.5	25.9	33.7	30.0	100
Average	0.68	6.96	36.06	33.78	23.12	100

Source: Survey Findings, (2014)

The findings in Table 5.13(b) depict that about 57.0% of the respondents saw the overall marketing activities as unsatisfactory or not rendered. The main reasons outlined were lack of marketing, lack of price information (57.0%) and communications facilities (63.7%) as well as marketing credit facilities (87.8%). Less than one percent of the respondents ranked these activities as excellent. As noted above, telecommunication facilities were available only in urban centres of Kagera as was the case for the rest of

the country. Villages were not well connected to the telecommunication system unless such villages were along trunk roads joining most commercial centres.

Interview results show that due to limited marketing credit facilities rendered by financial institutions, buying of coffee by the market channels is not adequately undertaken. The most vulnerable group in this segment of coffee supply chain is farmers who live in rural areas where communications and financial services are not provided to boost marketing functions. The findings in Table 6.13b are graphically presented in Figure 5.5(b) as follows: -

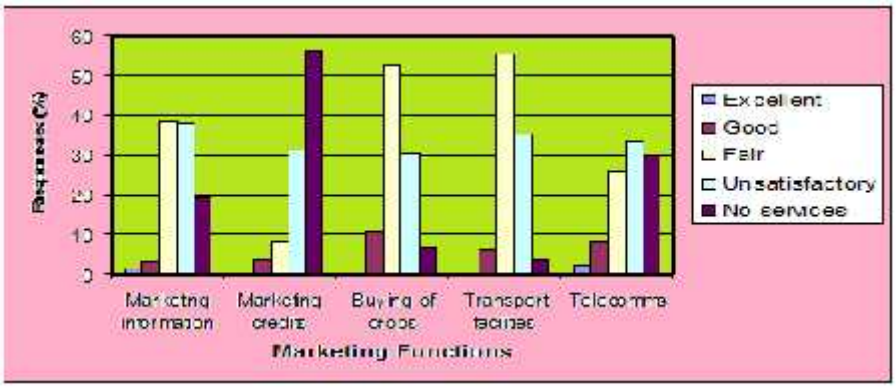

Figure 5.5(b): Farmers Assessment on Coffee Marketing Services

This research work assessed the coffee supply chain by conducting cross tabulations between the opinions of marketers and farmers so as to examine the efficiency of marketing institutions in order to provide a variety of tests and measures of association between categorical variables. This was done in order to compare the response of each category in the sample in respect to each variable examined. Marketing support services assessed include the following: -

i. Dissemination of Marketing Information

For the evaluation of dissemination of marketing information, respondents indicated a great dissatisfaction such that 58.0% of top management, 56.0% of supervisors and 50.5% of middle level officers in the category of markets ranked it either as no service provided or unsatisfactory. Meanwhile, only 14% of top management, 4.9% of supervisory class and 16.5% of middle level officers classified it in the category of good or excellent. However, this segment is not significant enough to portray the reality of the matter.

Farmers' evaluation of the aspect of provision of marketing information indicated that semi-educated farmers did not appreciate services rendered while educated farmers were satisfied with the services. A total of 75.0% and 66.7% of graduates ranked it as satisfactory while 35.6%, 40.3% and 47.4% of primary school, secondary school and certificate holders respectively ranked it as unsatisfactory. The main reason for such evaluation was that semi-skilled farmers mostly live in the rural areas while educated farmers live in semi-urban or urban centres. The latter is easily accessible with telecommunication services as well as dissemination of market and price information.

ii. Marketing Financial Facilities

Assessment by marketers indicates that 56.3% of respondent including 64.0% of top management, 39.0% of supervisors and 65.1% of middle class officers lied between fair and good category of ranking. None of the top management evaluated this activity as excellent while only 5.0% of the respondents ranked it as excellent. This was a positive assessment by the marketers. About 38.1% of farmers suggested that provision of marketing credits to marketing institutions was unsatisfactory and 38.5% of them indicated that it was satisfactory. There was no graduate farmer who suggested that there were no services provided. In addition, there was no indication of good or excellent services by graduates. However, in the overall assessment, 3.0% and 1.5% of respondents indicated that marketing credit facilities were provided at the level of good and excellent respectively. The study showed that provision of marketing credit facilities in Tanzania had a volatile aspect, taking into consideration the presence of a weak financial system. According to interviewed respondents, no efforts have been taken by a public or a private sector to ensure that commercial banks establish a special window for marketing financing within the existing financial institutions. Interviewed executives in marketing institutions observed that there was a need for Tanzania to establish a specific Marketing Credit Department in the Tanzania Investment Bank (TIB) in order to provide credits for the financial requirements for agricultural products marketing.

iii. Coffee Buying Services

Out of the 62.5% of marketers who ranked the services of buying of coffee as unsatisfactory, 56% were of the top management team, 70.4% of supervisory class and 59.6% of the middle level officers. Respondents who ranked this activity as fair included 28.0 of top management and the same percentage of supervisors. Similarly, 33.0% of middle officers in the visited marketing organisations did the same. Less than 5.0% of each category of respondents ranked buying of coffee as good or excellent.

The assessment made by farmers on the function of buying of crops indicates that none of the graduate category ranked it as poorly performed except semi-educated categories only. Meanwhile, respondents with postgraduate education ranked this function in two groups, namely unsatisfactory (33.3%) and good (66.7%). Another peculiarity is that none of respondent from farmers' category indicated this activity as excellent. All respondents with bachelor's degree in this category ranked the activity as satisfactory. General evaluation suggested that 30.4% of the respondents rank buying of coffee as unsatisfactory while 52.2% of them recommend it as satisfactory.

The research noted that markets benefited farmers with increased private sector participation, which raised relative farm-gate prices for coffee. From this point of view, 62.9% of interviewed farmers had opinion that buying activities are adequately undertaken. The introduction of private buying of coffee in Tanzania has been a 'wake-up call' for cooperative unions to improve service delivery to coffee farmers. coffee prices offered by private buyers for example, are relatively higher than those offered by cooperative unions.

iv. Coffee Transportation Facilities

Assessment of transportation facilities according to marketers indicates a least all categories were satisfied with the transportation facilities.While 46.7% of total respondents felt that it was inadequate, 53.3 felt that it was adequate. The research results show that 36.0%, 42.0% and 45% of top management, supervisors and middle officers' level respectively ranked it as unsatisfactory while 40.0, 44.4 and 38.5% of the same categories respectively ranked transportation services as fair. Farmers favourably evaluated the function of transportation of coffee in Kagera. This is from the fact that 55.2 % of the respondents reported that the function was satisfactorily carried out. Although none respondent ranked it as excellent, only 5.9% of them ranked it as good one. For instance, 50.0 % of primary school leavers and bachelor degree, 61.1% of secondary school leavers, 63.2% of certificate holders, and 66.7% of postgraduate qualification ranked transport facilities as satisfactory.

v. Communications Services

The assessment by marketers regarding provision of communications services for telephone lines, ICT systems, telefax, broadcasting, electronic media and print media showed dissatisfaction. A total of 57.1% of respondent confirmed their dissatisfaction with provision of communications services. About 38.0%%, 19.8% and 33.0% of Top management team, supervisory team and middle level officers respectively

indicated that the service was unsatisfactory. Likewise, 20.0%, 24.7% and 29.4% of the same categories of respondents observed that telecommunication services were moderately integrated in the supply chain of coffee in Kagera.

Farmers' evaluation of provision of communication services in coffee growing areas of Kagera indicates that only 1.9% of total respondents ranked it as excellent. However, only respondents with primary school education level participated in this assessment. A total of 63.7% of all respondents ranked this service as unsatisfactory. Among them, 34.9%, 25.0% and 31.6% of respondents with primary school, secondary school and diploma education respectively reported that it was not provided at all. Other respondents indicated it as satisfactory including 37.7% with primary school, 30.6% with secondary school, 26.3% with diploma, 25.0% with bachelor's degree and 33.3% with postgraduate qualifications. Only 9.5% of all respondents ranked communications services as good while 25.9% of them suggest that it is satisfactory.

5.4.5 Coffee Marketing Support Services in the Supply Chain

In order to assess the efficiency of the supply chain in coffee production the study applied Question (xii) and No. 9 of Interview Guide for Coffee Management Institutions and Workers in Government Ministries (Appendices III and IV) respectively. the assessment was grouped into two categories, namely the assessment that indicated no service provided and unsatisfactory which were expressed as "Inadequate" while assessment that indicated satisfactory, good and excellent which were expressed as "Adequate". Table 5.14 is the summary of the assessment on the integration of marketing support services in the coffee supply chain.

Table 5.14: Integration of Marketing Support Services in Coffee Supply Chain

Production Activity	MARKETERS				FARMERS			
	Inadequate		Adequate		Inadequate		Adequate	
	Rspndt	Percent	Rspndt	Percent	Rspndt	Percent	Rspndt	Percent
Marketing and price information	125	54.2	105	45.8	154	57.0	116	43.0
Marketing credit facilities	89	38.7	98	36.3	237	87.8	33	11.2
Coffee Buying	144	62.5	86	37.5	100	37.1	170	62.9
Transportation facilities	107	46.7	123	53.3	105	38.9	165	61.1
Communication services	131	57.1	99	42.9	172	63.7	98	36.3

Source: Survey Findings, (2014) KEY: Rspndt – Refers to Respondents

From Table 5.14, the study reveals that the functions of buying and transporting coffee are the only fairly integrated aspects in the coffee supply chain. Marketers' evaluation indicates that only transportation facilities were adequately linked in coffee supply chain while marketing and price information, marketing credit facilities and communications services were classified as being inefficient and thus not integrated. More than 54.0% and 57.0% of marketers and farmers indicated price and markets information to be inadequate, while 38.7% and 87.8% of the same respondents suggest the same with regard to marketing credit facilities' function. The functions of coffee purchase and transportation only have been supported by more than 50% of respondents with observation that they are Adequate. The above assessment is graphically presented on figure 5.6: -

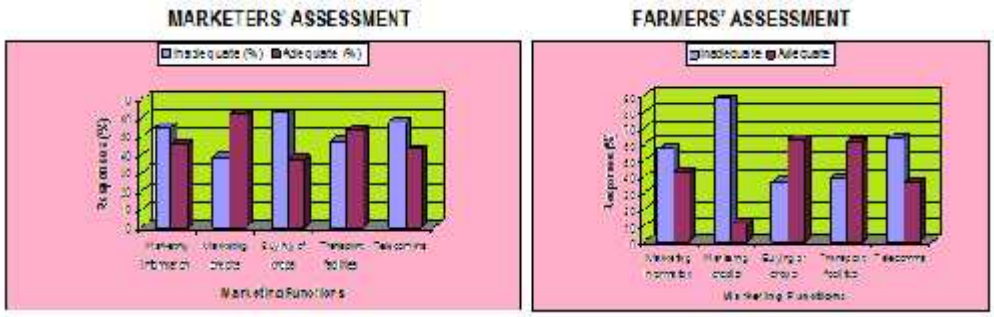

Figure 5.6: Marketers and Farmers Evaluation of Integration of Marketing Services in Coffee Supply Chain

5.4.6 Constraints Facing Coffee Marketing Support Services

The study through the use of Question No. 5.9 and No. 11 in the Questionnaires for Farmers and Leaders of Farmers Association and for Farmers only (Appendices I and II) explored the challenges that respondents always faced in the course of coffee marketing. Table 5.15 indicates that all challenges facing farmers in the course of rendering or receiving coffee marketing support services are interlinked. For example, selling low quality products is highly linked with other factors such as poor marketing infrastructure especially lack of power supply in rural areas and lack of reliable storage facilities. Others linked factors are lack of processing facilities, which also result from lack of capital for purchase of such processing equipment and machines. This research work noted that methods applied to educate farmers about coffee production, processing and marketing of coffee are not reliable as well. The research results showing a list of constraints facing coffee marketing support services are summarised in Table 5.15:

Table 5.15: Factors Affecting Coffee Marketing Support Services in Kagera

FACTORS	Responses	% of Responses	% of Cases
Selling coffee of low quality thus fetching low prices	161	21.8	59.6
Inadequate provision of price and Markets information services	145	19.7	53.7
Poor marketing infrastructure (Human, roads, ICT and buildings)	30	4.1	11.1
High transactions costs throughout the supply chain	101	13.7	38.2
Lack of awareness among farmers due to ignorance	20	2.7	7.4
Absence of farmers participation in determining of prices of coffee	69	9.4	24.8
Poor transport facilities (trucks and railways)	18	2.4	6.7
Lack of reliable storage facilities before selling season	30	4.1	11.1
Poor financing for undertaking marketing activities	163	22.1	60.4
Totals	737	100.0	273.0

Source: Survey Findings, 2014

The findings in Table 5.15 suggest that out of 737 responses, the three major factors posing a challenge to coffee marketing are the safety of low quality coffee (21.8%), poor financing for undertaking marketing activities (22.10%) and inadequate provision of price and markets information services (19.7%). However, the study revealed that factors that were proposed by the minority of the respondents are lack of awareness among farmers due to ignorance (2.7%), poor transport facilities (2.4%), poor marketing infrastructure (Human, roads, ICT and buildings) and lack of reliable storage facilities before selling season.

5.5 Assessment of Support Services in the Coffee Supply Chain

To assess the proper application of SCM to the entire coffee operations, the study adopted Question 6.5 of the Questionnaire for Farmers only (Appendix II). The question listed all key coffee services for production, processing and marketing and respondents were requested to indicate all those activities integrated in the coffee supply chain of which stakeholders participate in their execution.

The findings in Table 5.16 indicate that among the three key segments of the coffee supply chain, coffee processing has been partially doing well in terms of integrating some of its activities in the supply chain by

allowing participation of the key stakeholders in their implementation. A percentage of more than 50% of respondents indicated that out of a total of 22 different types of coffee management services, only six of them comprising harvesting (87.7%), storage and fumigation (54.0%), transportation of coffee (78.0), coffee quality control, grading and specifications (74%), packaging (77%) and recycling of coffee wastes (78.8%) have been doing well in the application of SCM principles. The findings on stakeholders' participation are summarised and presented in Table 5.16 as follows:

Table 5.16: Stakeholders' Participation in Management of the Coffee Supply Chain

S/No	Supply Chain Activity/Service	Counts & percentage
1	Inputs Supply and Use	36 (53.0)
2	Research and Development	7 (10.0)
3	Extension Services	33 (49.0)
4	Preparation of Improved seeds	19 (28.0)
5	Early warning Information	10 (15.0)
6	Training to Farmers and Extension staff	27 (40.0)
7	Introduction of new technology	25 (37.0)
8	Disease and Pests control	47 (69.0)
9	Financial and input credit facilities	6 (9.0)
10	Harvesting	60 (87.7)
11	Storage and fumigation of stores	37 (54.0)
12	Transportation and handling of coffee	53 (78.0)
13	Hulling (removal of outer cover of the coffee)	3 (4.0)
14	Quality control, grading and specifications	50 (74.0)
15	Packaging Services	52 (77.0)
16	Processing	54 (79.0)
17	Recycling of wastes	53 (78.8)
18	Development of Markets	2 (3.0)
19	Price determination	3 (4.0)
20	Infrastructure development	14 (21.0)
21	Telecommunication	3 (4.0)
22	Sourcing credit (loans & letter of credit)	3 (4.0)

Source: Study Findings, 2014

The general assessment in Table 5.16 for the application of SCM in 22 types of support services rendered to coffee production, processing and marketing shows that only six (equivalents to 27% of all services) had adequate application of SCM while the rest 16 (equivalent to 72% of all coffee services) had inadequate application of SCM principles. The findings also indicate that 7 (31%) out of 22 activities were assessed by less that 10% of the respondents. The respondents' opinion was for TCB to streamline integration and application of SCM principles within the entire coffee supply chain. They felt that TCB concentrated on coffee marketing function only, leaving other functions unattended to thereby leading to non-integration of all components of the coffee supply chain. Question 12 of the Questionnaire for Farmers and Leaders of Farmers' Association (Appendix I) was helped examine whether the government and other authorities did practically apply SCM in co-ordinating activities related to coffee production, processing and marketing.

Respondents were instructed to indicate “YES” if there was proper application of SCM principles or “NO” if there was no integration of coffee services. The findings are summarised in Table 5.17:

Table 5.17: Assessment of Coffee Institutions in Application of Supply Chain Management Principles

	Respondents	Percentage	Valid Percentage	Cumulative Percentage
YES	73	27.0	27.0	27.0
NO	197	73.0	73.0	73.0
Total	270	100.0	100.0	

Source: Study Findings, 2014

The results in Table 5.17 show that out of a total of 270 respondents, only 73 of them (equivalent to 27%) said YES while 197 of the respondents (equivalent to 73% of the total sample) said that there was NO application of SCM in coordinating services in coffee production, processing and marketing, giving the impression that the supply chain was not well integrated.

5.6 Conclusion

The study applied the SCM conceptual framework, the selected research methods, instruments and responded to the research questions, objectives and propositions. It collected information regarding basic agricultural activities in the coffee supply chain from production through consumption. The information was qualitatively organised and systematically summarised in terms of coffee production, processing and marketing support services so as to examine their influence on production and productivity of coffee in Kagera. Various tables and graphs were constructed in order to summarise the findings in a manner necessary for their synthesis, analysis and interpretation. The overall objective was to determine the application of SCM principles and eventually proposing an appropriate conceptual SCMConceptual Model in the coffee industry in Kagera.

CHAPTER SIX

SYNTHESIS ANALYSIS AND RESULTS

6.1 Introduction

The preceding chapter presented research findings regarding basic agricultural support activities and services along the supply chain from production to consumption. It involved the organisation of the findings on production, processing and marketing support activities and services so as to examine their influence on production and productivity of coffee in Kagera region. The overall objective was to determine the application of an appropriate SCMconceptual model in the coffee industry in Tanzania using a case of Kagera region.

Chapter Five applied the SCM conceptual framework and the selected research methods and instruments to collect different prescribed data regarding coffee production through consumption in order to respond to the research questions, specific research objectives and research propositions. The chapter qualitatively organised, summarised and systematically ordered data in terms of coffee production, processing and marketing support services so as to examine their influence on production and productivity of coffee in Kagera. It summarised the data in tables and graphs for synthesis, analysis and interpretation.

Chapter six presents the amalgamation of the research findings and then the synthesis, descriptive and empirical analysis of those findings about basic coffee support activities and services along the supply chain from production to consumption. It examines their influence on coffee production and productivity in Kagera region. Its overall objective is to assess the level of application of an appropriate SCM to set the basis for developing the new SCMM in the coffee industry in Kagera in case the existing model does not deliver the intended results. In view of the research proposal for this study, the selected research methods and instruments facilitated the data collection exercise in Kagera in order to provide synthesis and analysis to respond to the pre-determined research questions, research propositions and attain the specific research objectives.

6.1.1 Research Questions:

i. Are coffee marketing support activities and services significantly linked to production and processing to allow application of SCM?;

ii. Do coffee management institutions provide mandatory services to enable farmers undertake production, processing and marketing support activities and services for this crop?; and
iii. Are the marketing support activities and services significantly integrated in the coffee supply chain in order to enhance its marketing?

6.1.2 Research Objectives:

The specific research objectives for this study include to:

i. examine the status of application of SCM in production, processing and marketing support activities and services for coffee;
ii. analyse the coffee management institutions in provision of mandatory services to enable undertaking production, processing and marketing support activities and services for this crop;
iii. assess the marketing support activities and services to find out whether are intergraded along the coffee supply chain to enhance its marketing; and
iv. suggest the appropriate conceptual SCMM for coffee Industry in Kagera region

6.1.3 Research Propositions

i. Coffee production, processing and marketing support activities and services are not significantly linked so as to allow application of SCM;
ii. Coffee Management Institutions do not provide mandatory services to enable undertaking of production, processing and marketing support activities and services for this crop; and
iii. Coffee Marketing support activities and services are not significantly integrated to enhance its marketing

6.2 Synthesis and Analysis of the Research Findings

Essentially, this section focuses on the consolidation of findings in the areas of coffee production, processing, marketing support activities and services, and the status of the application of SCM.

6.2.1 Coffee Production Support Services

Coffee production in Kagera, like any other agricultural crop in Tanzania, is dominated by primary production with little value addition (semi-processing). Generally, the study reveals that more than 57% of workers and 62% of farmers see that coffee production has been decreasing for the last fifteen years (see Table 5.2 and Figure 5.2). The reasons for decline in coffee production as indicated on Table 5.3 of Chapter Five are farmers' reluctance to adopt modern farming technologies, lack of working tools and incentives for extension workers, use of middlemen in buying crops that distorts the set-up of supply chain,

insufficient government budget for agricultural sector, inadequate training programs to agric staff and farmers, Inadequate number of extension staff up village level and Lack of dissemination of research results to farmers. Others are poor infrastructure (roads, transport facilities and communications), high costs of inputs due to abolition of subsidy, political interventions in management of coffee, lack of capital for rural farmers to afford recommend farming technology, poor marketing system for coffee (lack of price and market information), bureaucratic procedures applied for supply of agricultural inputs, weak public-private sector linkage due to erratic policies on agricultural crops and existence of three line ministries supervising agriculture. Based on these study results, the analysis has revealed that responses provided by workers on the aspects of input supply services, financial credit facilities, training services and introduction of new production technologies are based on the data from the files. However, farmers' response facts as they are practically involved in coffee production year after another.

The general observation is that workers and farmers have two opposite perceptions about the supply chain behaviour. While farmers feel that there is inadequate provision of production services, workers feel that there is adequate provision of such services. This is because farmers are consumers of coffee services while workers are coffee production service providers Therefore, there are two forces demand and supply pulling in two different directions.

This study indicates that the trend of declining coffee production is an outcome of inadequate application of SCM principles along the production segment of the coffee supply chain as presented in Table 5.5Findings show that farmers do not see proper integration and are dissatisfied with the coffee production services except 67.8% and 71.5% of them who observe application of SCM along the coffee supply chain only in terms of research and development and dissemination of improved seeds respectively.

6.2.2 Coffee Processing Support Services

This study found that coffee from Kagera has opportunities in high value markets, but is faces challenges in its supply chains particularly the inability to employ modern processing facilities. The findings about coffee processing present two different outlooks about integration of services rendered by this segment along the coffee supply chain. While workers in the government and crop authoritieshave negative perception about it, processors and farmers have positive perception. Basically, these services are provided by the private sector while the government certifies the provision of such services through its agencies.

The evaluation done by respondents about coffee processing through interviews is almost the same as that obtained through questionnaires. Respondents indicated that the trend of coffee processing was gradually improving and promising, an indication that processing of coffee was practically improving and is modernised through private sector participation in agro-processing. As such it is due to increased competition among coffee processors. Table 5.8 shows that 60% of processors and 57.9% of workers indicated that this aspect is adequate whereas 54.8% and 56.3% of processors and workers respectively ranked recycling of waste materials as inadequateWith regard to recycling, the findings indicate that respondents were not satisfied with the activity. Nonetheless, most respondents seemed to be satisfied with the level of most of the processing activities, an indication that most of coffee processing services were well linked along the coffee supply chain thereby confirming is the presence of adequate application of SCM in coffee processing.

The analysis also noted that coffee processing is dominated by traders and middlemen such such that farmers can not determine its price, weights and markets. Most farmers sell unprocessed (without any value added process) coffee. The factors influencing the amount of value added in processing of coffee are scale of processor, packaging, taxation and production site[22]. However, the study, noted some optimism that there was high potential in coffee processing for value addition. Similarly, evaluation made by workers as also reflected in the Agricultural and Livestock Policy of 1997[23] indicates that the inadequate private sector participation in crop quality control services has weakened coffee quality control. The study noticed that quality control system in coffee is still at the infancy stage such that it does not provide adequate protection to the consumer against health hazards. Thus, the challenges came as quality control facilities are concentrated in the commercial capital city, making inspection of processing factories upcountry expensive and not comprehensive. The only legitimate body for quality control is TBS, a public organisation responsible for standardisation, certification, quality assurance, and metrology services.

Findings from the observation schedule report burning of coffee cherries near the coffee curing factories in Bukoba and Karagwe districts. According to interviewed respondents, the farmers were burning cherries feaing that they contained diseases and pests that would attack coffee plants in their farms. This proves and concurs with the observation that most farmers lack the knowledge of recycling and how such waste

22 Some of coffee producing areas are located in the remote corners where there is no power supply to support installation of processing plant and it is not possible to transport bulky of coffee from there.

23 Private sector is constrained by limited financial ability, poor infrastructure and unfriendly legal and administrative framework. Thus, its participation in provision of agricultural services has put quality control services at risk

products could be economically utilised. Burning of coffee waste materials is the manifestation of lack of understanding and capital for acquiring modern technology that could prevent environmental pollution.

6.2.3 Coffee Marketing Support Services

This section presents the performance of marketing institutions in Kagera region with focus on the strengths and constraints facing coffee marketing. The objective of the study was to analyse whether institutions involved in coffee marketing employ SCM in coordinating marketing of this crop. The study revealed that while transportation facilities and buying of coffee are better performed and integrated along the coffee supply chain, marketing information, provision of marketing finance and communications services are not well articulated by the coffee supply chain. Their inefficiency is highly influenced by the challenges facing the marketing of coffee in Kagera. The study further noted that lack of financial support, coupled with inadequate dissemination of marketing information disrupts marketing of coffee.

Failure to disseminate marketing information to producers is due to inefficiency among co-operative unions and TCB. The study results indicated that TCB is supposed to concentrate on regulation and policies formulation only while marketing activities could be left in the hands of the private sector. The research revealed that co-operative unions are rife with nepotism, opportunism, lack of key trained staff and embezzlement of funds. This study sees that Tanzania's embassies abroad have not adequately played their role of providing market information and opportunities available for Tanzanian coffee.

Data from the collected documentary records and face-to-face interview revealed that a well-developed infrastructure in rural areas was desirable in order to stimulate transportation of coffee. Investments in rural roads, transportation, storage facilities and communications were mentioned as pillars for stimulating coffee production. It was further indicated that in view of the geography of Kagera region, the districts of Karagwe and Kyerwa have high coffee potential but access to coffee from these districts is difficult because they are located in the peripheries of the region. Thus, roads occupy a pivotal position in the integration of markets and regional economy. Poor rural roads are limiting traders and farmers access to markets and inputs respectively. In addition, the analysis indicated that due to inadequate communications system, marketing information and marketing financing, the volume of coffee exports has been declining in the last decade. The scrutiny on constraints facing coffee marketing suggest that farmers have a weak competitive advantage and less limited influence on marketing decisions than buyers because have no strong and registered associations. As reflected in Table 5.14 of Chapter Five, the study noted that coffee buying and transportation services are the only integrated functions along the coffee supply chain.

6.2.4 Application of Supply Chain Management Techniques

Generally, the study revealed that the application of SCM principles in coffee production, processing and marketing was not well articulated. The findings presented in Chapter Five especially in Table 5.16 indicate that about 27% of all coffee management services show adequate application of SCM while more than 72% of them were classified as inadequate practitioners of SCM. From these results, the proper application of SCM is about 27% which supports the idea of the need for developing an appropriate coffee SCMM for Kagera.

The findings in Section 5.4.7, Table 5.16 of Chapter Five cements the facts contained in the same Table whereby the study reveals that about 73% respondents confirmed that most of coffee management institutions do not portray application of SCM in rendering services to coffee production, processing and marketing except only 27% of the sample frame who had an opinion that there is application of SCM. Thus, the findings of the study suggests that majority of respondents have the opinion that the government and other crop authorities did not apply CM in co-coordinating activities related to coffee production, processing and marketing. While at production stage farmers were satisfied with most of the services rendered to them, they were happy with the research and development, pests and disease control as well as dissemination of improved seeds activities. Farmers were not satisfied with provision of extension services, financial and input credit facilities and training. In addition, the study noted that farmers and workers had differentviews about production services because workers are service providers while farmers are consumers of the same.

The general assessment shows that while on average coffee processing support activities and services fairly applied SCM principles, production and marketing support activities and services were far behind. This was revealed by the assessment indicated in Chapter Five, sections 5.2.4, 5.3.3, 5.4.5 and 5.4.7 also tables 5.14, 5.16 and 5.17 as well as Figure 6.1 whereby all of them support the fact that there is partial application of appropriate SCM in the coffee supply chain.

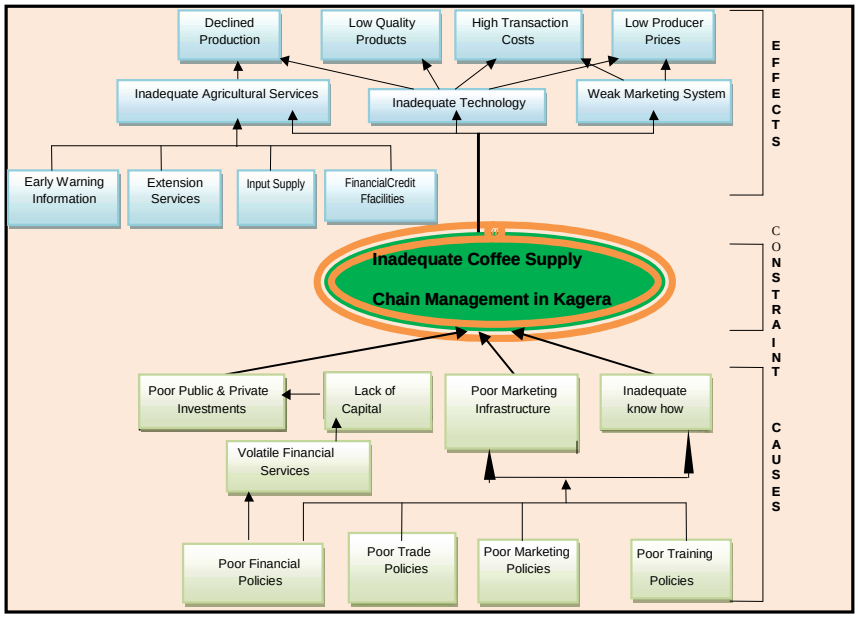

Figure 6.1: Causes and effects of inadequate coffee SCM in Tanzania

The problem tree represented in Figure 6.1is a key instrument for analysing the exiting situation in coffee production, processing and marketing support activities and services in Kagera. The problem tree depicts a visual representation of the analysis of constraints confronted in coffee sub sector in Kagera. Along with the problem, there are causes and effects of the problem. Like any other tree, the problem tree above indicates three main parts; the trunk, roots and branches. The trunk is the core problem (inadequate application of SCM). The roots represent the causes of the core problem (that is. lack of good policies, volatile financial services and lack of institutional arrangements). The branches represent effects namely inadequate extension services, poor technology and weak marketing services.

Therefore, Figure 6.1 indicates the core challenges revealed by the study regarding application of SCM in coffee production processing and marketing support activities and services in the context of this study. There are poor policies of training, marketing, trade and finance thus causing lack of institutional arrangements and volatile financial services, inadequate training[24] to farmers and agricultural staff, poor infrastructure[25], lack of capital and weak agricultural investments. In such circumstances therefore, SCM is

24 Inadequate training refers to existence of old agricultural and research centers. There are nine training colleges and seven research centres. The enrolment has been declining due to inadequate budget and training facilities.
25 Agricultural infrastructure refers to transport communication, power supply, roads, buildings, ICT, and marketing facilities. It refers to entire capital stock necessary to facilitate coffee production, processing and marketing.

likely fail to operate within the public and private crop management authorities. While infrastructure and training are not focused in the designed policies also the SCM fails to operate. The effects include inadequate agricultural services, application of poor and old technologies as well as weak marketing system. Eventually they lead to declined production, low quality products, high transaction costs, low producers prices and lack of markets for coffee.

This study focused more on the application of SCM and its impact on coffee production, processing and marketing support activities and services. The importance of the application of SCM in determining the efficiency of economic, physical and social systems cannot be over emphasised. The study found that there are still theoretical gaps and issues that have been brought to the surface for policy attention and probably need further research in Kagera region. The study noted that one of the major causes of poverty among most people in Kagera (rural areas) is poor performance of the coffee sub-sector particularly low production, poor processing and inadequate access to coffee market.

The findings indicate that the supply chain of the coffee subsector is weak and fragmented. It is fragmented in sense that the provision of some basic agricultural support activities and services including input supply, financial and credit facilities to coffee farmers as well as extension services are not adequately provided. Sometimes are not provided at the right time and in some cases are not provided at all. Despite this situation, the quality control system seems unsatisfactory; it does not provide adequate protection to the consumer against health hazards. Meanwhile, rendering of coffee marketing information, provision of marketing credits or guarantees and communication services, are not well articulated in the whole coffee supply chain.

6.3 Evidence to Answering Research Questions

The selected methods and instruments facilitated collection of data and the research findings were presented in order to respond to the research questions as follows: -

6.3.1 Are coffee marketing support activities and services significantly linked to production and processing to allow application of SCM?

In Chapter Five section 5.4.5, Table 5.14 presents the research findings in which the study noted that the functions of buying and transportation of coffee are the only fairly integrated in the coffee supply chain. Results further indicate that marketing and price information, marketing credit facilities and communications services were not integrated. Thus, more than 50% of all categories of respondents (marketers and farmers) indicated price and markets information to be inadequate.

The research findings in Table 5.16 and 5.17 under section 5.4.6 of Chapter Five indicate that the general assessment of application of SCM show that 27% of all services were indicated to have adequate application of SCM while more than 72% of all coffee services were classified as inadequate to application of SCM principles. In addition 73% of farmers indicated that there is no application of SCM principles in coordinating production, processing and marketing of coffee. This means, the activities are not linked in the coffee supply chain so as to allow application of SCM. The study found that marketing support activities and services are not significantly linked to production and processing support activities and services to allow application of SCM principles.

6.3.2 Do coffee management institutions provide all mandatory services to enable farmers to undertake production, processing and marketing activities and services for this crop?

With regard to the challenges facing coffee management institutions during coffee production stage, the study in Chapter Five, section 5.2.2 enumerates the following:

i. Low capital base due to lack of credit facilities from financial institutions;
ii. Unsatisfactory disease and pest control system;
iii. Weak communication between government and farmers;
iv. Inefficiency of crop management authorities particularly co-operative unions;
v. Farmers' reluctance to cooperate with extension staff to adopt modern farm technologies
vi. Lack of working tools and incentives for extension workers
vii. Insufficient government budget for agricultural sector
viii. Inadequate training programs to agric staff and coffee farmers
ix. Inadequate number of extension staff up village level
x. Poor infrastructure such as roads, transport facilities and communication system
xi. High costs of inputs due to abolition of subsidy in agricultural sector
xii. Political interventions in Management of coffee
xiii. Weak public-private sector linkage due to erratic policies on agricultural crops including coffee

Challenges facing coffee processing institutions are outlined in Chapter Five, Table 5.8 of section 5.1.3 as follows: -

i. Lack of credit support and capital for coffee processing
ii. Reluctance of government to spearhead value addition as most of coffee is sold in raw form
iii. Inadequate technical or skilled personnel on coffee processing
iv. Lack of farmers sensitization for primary processing
v. Most of farmers use poor and outdated coffee processing technologies and machines

Table 5.10 under Section 5.4.2 of Chapter Five highlights the challenges facing the coffee management institutions. These include co-operative societies, co-operative unions and coffee marketing board whereby these challenges lead them to failure to deliver the mandatory services. The results show that more than 50% of respondents indicated poor performance of coffee management institutions. The challenges they face are:

i. Weak capital base due to poor financial services
ii. Poor coffee buying services
iii. Poor coffee marketing infrastructure

The prevalence of the above listed challenges facing coffee management institutions in the region hinders them from rendering legitimate services. Thus, there is clear evidence that coffee management institutions do not provide all mandatory services to enable farmers undertake coffee production, processing and marketing support activities and services.

6.3.3 Are the marketing services integrated in the coffee supply chain in order to enhance its marketing?

Chapter Five applied Table 5.14 under Section 5.4.5 to present the research findings which show that the coffee buying and transportation services are the only fairly integrated in the coffee supply chain while the rest of the services of coffee marketing are not integrated in the same.Therefore, since only two marketing support activities and services are integrated and the rest are not, the study has sufficient evidence that marketing support activities and services are not significantly intergrated in the coffee supply chain to enhance its marketing.

6.4 Evidence to Support Research Propositions

As was the case for research questions, the collected data and subsequent research results were applied to present evidence to support the research propositions as follows:

6.3.4 Proposition One: "Coffee production, processing and marketing support activities and services in Kagera are not linked so as to allow application of SCM principles"

Chapter Five, section 5.4.5, Table 5.14 presents the research results whereby the study noted that not all services of coffee marketing are integrated in the coffee supply chain. The research results further show that more than 50% of all categories of respondents (marketers and farmers) indicated that 80% of the coffee marketing services is not linked to coffee supply chain. Similarly, in the same Chapter, Table 5.16 and 5.17 under section 5.4.6 indicate that the assessment of application of SCM show that 40% of all services have adequate application of SCM while 60% of all coffee services are classified as inadequate in application of SCM. In addition 73% of farmers indicated that there is a partial application of SCM principles in coordinating production, processing and marketing of coffee.Therefore, there is sufficient evidence to

support the proposition that coffee production, processing and marketing support activities and services are not significantly linked so as to allow application of coffee SCM in Kagera.

6.3.5 Proposition Two: Coffee management institutions do not provide mandatory services to enable farmers undertake production, processing and marketing of this crop.

The results presented in Chapter Five under section 5.4.2, Table 5.10 show the challenges facing the coffee management institutions and challenges facing coffee processing institutions as indicated in Table 5.9 under section 5.3.5 as well as the results in Table 5.4 under section 5.3.4 of the same Chapter outlined challenges facing coffee management institutions which hinder them from rendering their obligatory services.Thus, there are adequate verifications to substantiate the proposition that coffee management institutions do not provide all mandatory services to enable farmers undertake production, processing and marketing support activities and services for this crop in Kagera.

6.3.6 Proposition Three: Marketing support activities and services are not integrated to enhance coffee marketing.

Table 5.14 of sub section 5.4.5 as well as Figure 5.5 in Chapter Five, present the research results which show that coffee buying and transportation are the only functions that are fairly integrated along the coffee supply chain while the rest of the functions of coffee marketing are not integrated in the same chain. Further more Table 5.15 of sub section 5.4.6 of the same Chapter indicates that coffee marketing services face negative factors that cannot give room for their smooth integration in the coffee supply chain. There are sufficient facts and data to validate the proposition that integration of marketing support activities and services in the coffee supply chain is partially coordinated. Thus, marketing support activities and services are not fully integrated along the coffee supply chain to enhance coffee marketing.

The answers for research questions and propositions are summarised in Table 6.1 below:

Table 6.1: Summary of Research Questions and Propositions

RQs/PROPs	Illustration Reference	Relevant Coffee SCM Components	Current Status of Coffee SCM Components		
			Fully	Partially	Not Embraced
RQ1	Table 5.14 in section 5.4.5	Buying and transportation services		X	
		Marketing and Price Information, Marketing Credit Facilities and Communication			X
	Table 5.16 and 5.17 in section 5.4.6	27% of all coffee marketing services	X		
	Table 5.16 and 5.17 in section 5.4.6	73% of all coffee marketing services			X
RQ2	Table 5.10 in section 5.4.2	Co-operative societies, co-operative Unions and coffee Marketing Board services		X	
		Financial Services, coffee Buying and marketing infrastructure services			X
RQ3	Table 5.14 under Section 5.4.5	coffee Buying and Transportation services		X	
		The rest of the services except those above			X
PROP 1	Table 5.16 and 5.17 in section 5.4.6	40% of all coffee production, processing and marketing services	X		
		60% of all coffee production, processing and marketing services			X
PROP 2	Table 5.10 in section 5.4.2	financial services, price information, price determination, marketing infrastructure and Buying of coffee		X	
PROP 3	Table 5.14 of sub section 5.4.5 as well as Figure 5.6	Buying and transportation	X		
		The rest of the Marketing services except those mentioned above			X

KEY: RQs - Research Questions PROPs – Propositions

Table 6.1 indicates that few components of the coffee SCMM are fully embraced while some of them are partially embraced. Most of the components are totally not embraced in the coffee SCMM for Kagera which calls for the need of developing an appropriate coffee SCMM for the region.

6.5 Conclusion

The synthesis and analysis of the study findings indicate that there are adequate verifications to prove that marketing support activities and services are not significantly linked to production and processing support activities and services to allow application of SCM principles. Likewise, it is evident that coffee management institutions do not provide all mandatory services to enable coffee farmers in Kagera region to undertake coffee production, processing and marketing support activities and services. Furthermore, since only two marketing services (coffee buying and transportation) are the only aspects integrated and the rest are not, it is evident that marketing services are not significantly integrated in the supply chain to enhance coffee marketing in Tanzania.

CHAPTER SEVEN

CONTRIBUTION TO KNOWLEDGE: CONCEPTUAL SCM MODEL

7.1 Introduction

Chapter Six presented synthesis and analysis of the research findings through the descriptive and empirical analysis of the basic coffee support activities and services along the supply chain from production to consumption. The overall objective of the chapter was to assess the level of application of SCM principles to set the basis for developing an appropriate conceptual SCMM in the coffee industry in Kagera as the existing model does not meet the intended results. In view of this study, the synthesis and analysis enabled the researcher to respond to the pre-determined research questions and research propositions as well as attain the overall and the specific research objectives.

Chapter Seven aims at examining the existing conceptual coffee SCMM and documenting the development of an appropriate conceptual SCMM for the coffee supply chain in Kagera. The chapter intends to develop an integrated conceptual model which entails planning of many components in the coffee supply chain such as suppliers, materials, resources, warehouses, transporters and customers. The model has been developed and proposed for application in Kagera region in order to address shortcomings addressed in Chapter Six, Table 6.1. The proposed conceptual model[26] is based on the unitary structuring technique in production, processing and distribution networks which are combined into a single structure as explained in Chapter three section 3.7. The system design and implementation details are presented. The developed of an appropriate conceptual model is descriptive a one that can be used to describe how a coffee supply chain in Kagera should operate.

The formulation of the conceptual coffee model emanates from a variety of angles, including model planning, structuring, integration, and representation. Thus, coffee supply chain has three important facets, namely formulation of tasks, control considerations, and the opportunism in the process of formulation. Hence, a proposed conceptual model presents the characteristics of a real and ought to be the coffee supply chain in Kagera. The formulation of the conceptual model involved capturing the problem descriptions, understanding the essential elements by studying structure, selecting a suitable tool with its underlying structure, and finally proposing sequential implementation of the model in Kagera.

26 Conceptual Model is not explanations of phenomena but a theoretical or an abstract structure that has been developed by the author to represent the real world problem.

7.2 Basis of Coffee Supply Chain Management Model

The development of coffee SCMM for Kagera was motivated by both internal and external factors such as globalisation and international trade, information availability and environmental concern. This is because coffee is not only the backbone of the economy of Kageraregion but also is the world's second most trade commodity next to oil. Therefore, like any other type of SCM, coffee supply chain borrows a lot from the theory of supply chains. hence, the proposed coffee supply chain consists of several links called actors in Kagera, namely coffee factories, farmers, private coffee buyers, transporters, marketers, wholesalers and retailers as reflected in Figure 7.1

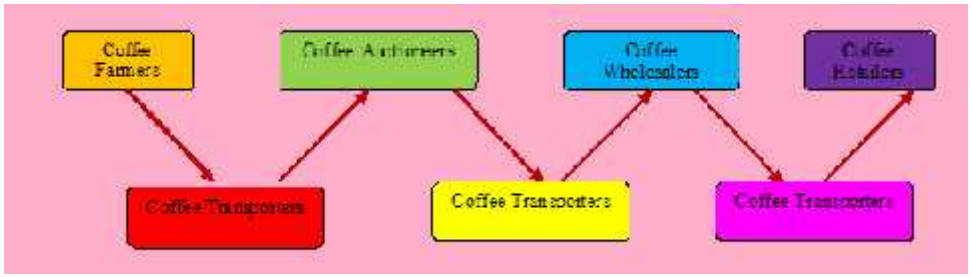

Figure 7.1: Integration of Actors in the Coffee Supply-Chain

In the coffee supply chain to be developed for Kagera, each actor performs operations, which alter or modify the coffee product in such a way that it reaches the end-user according to his/her specifications. According to the proposed coffee supply chain model, the product characteristics are represented by one or more coffee states. During the coffee transportation and storage processes, nothing happens to the product's state. The actions that take place in coffee supply chains are called handling (actions which alter or modify the state of the coffee) and transportation and storage (actions that do not alter the state of the coffee). The basis for the proposed conceptual coffee supply chain model has been inspired by many factors such as the management of coffee quality assurance, processing, marketing and competition at coffee markets and networks. In order for coffee to compete, an important feature is product quality, which is continuously liable to changes. Thus, in coffee-chains, this continuous process is referred to as quality development whereby the three main types of actions for quality assurance are: -

(i) Handling: actions that intentionally alter or modify the appearance of the state of the coffee;
(ii) Processing: - actions that intentionally alter or modify the quality state of the coffee; and
(iii) Transport and storage: - actions that intentionally or unintentionally do not alter the state of coffee.

The control of process during handling, processing, transportation and storage of coffee is what is called SCM. Because the coffee chain consists of several actors (see Figure.7.1 above), coffee SCM refers to the management of the coffee supply chain by defining which actors should perform which actions in order to ensure coffee customer satisfaction.

7.3 Institutions within coffee supply chain in Kagera

According to the theory of supply chains, final product (coffee) is created by a set of activities with a precedence relations between them executed and directed by a series of institutions within the supply chain. The activities are organized, managed, co-coordinated and controlled by several actors. In the context of this study, actors in the coffee supply chain for Kagera region region such as co-operative unions, transporters, commercial banks, coffee farmers' associations, coffee processors, private coffee buyers and exporters and many others are referred to as institutions. All of them are coordinated and managed by the TCB. The linkages among these institutions are the primary subject of coffee SCM Model.

7.4 Coffee Supply Chain Management Conceptual Model

In the supply chain conceptual model, there is interdependence between actors usually organised sequentially, and one actor's output is another actor's input. Hence, the value created from managing these transactions is from cost reduction theory. In the proposed coffee supply chain model, coffee goes through several links before reaching the end-user as illustrated in Table 7.2.

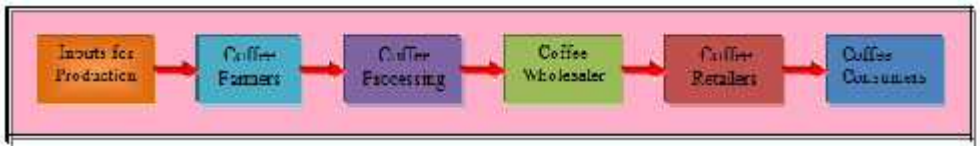

Figure 7.2 Traditional Way of Viewing the Coffee Supply Chain

In the conceptual coffee supply chain in Figure 7.2, the transactions between actors are vertically integrated, thus implying sequential interdependencies. Therefore, the actors in the coffee supply chain should be tied and mutually dependent. Hence, actors in the proposed conceptual coffee SCMM for Kagera region will be linked to one another to bring interdependency and synergism thereby reducing costs.

7.5 General Requirements for Coffee Supply Chain Model

Any coffee supply chain involves semi-autonomous parties, which may have conflicting objectives. In the proposed conceptual coffee SCMM for Kagera region, cooperative unions and private traders portray this characteristic. Actions of one actor in the coffee supply chain may influence the characteristics for the next actor. However, coffee SCM requires, among others, the alignment of strategies and interests, information sharing, collaborative planning decisions and shared instruments. Even when there is a strong partnership among actors (e.g. the use of common curing factory for hulling of coffee), in practice, there are potential conflict areas, such as local versus foreign interests, and a reluctance of sharing common information on coffee production, processing and marketing. Thus, coffee SCM requires strong trust and in-depth insight among players, which is sometimes difficult. The proposed conceptual coffee SCMM for Kagera region suggests the presence of the governance bodyTCB to harmonise relationship and partnership among actors.

The aforementioned characteristics are essential ingredients to ensure active participation and cooperation of all parties in the coffee supply chain for the effective operation of the proposed conceptual model. Therefore, involvement and collaboration among actors in the coffee supply chain is not only a prerequisite for solution acceptance, but also fosters creative minds in finding alternative and better solutions – building on each other's expertise in the coffee supply chain operations. To facilitate an active involvement in decision making and solution finding, high demand is set on the coffee SCMM transparency and completeness. Transparency refers to the insight into components and their workings whereas completeness addresses a full overview of parameters.

7.6 Coffee Supply Chain Management Practices

In the theory of supply chains, the actors must perform well in order to achieve better product delivery to consumers. This requires interfacing between many techniques across applications and individual players. In the proposed coffee SCMM for Kagera region, the main processes are the coffee cultivation, handling, hulling, storing, packing, transportation, and trading (export). All of these stages leave the intrinsic characteristics of the coffee grown be it Arabica or Robusta. Effective management of the proposed coffee SCMM for Kagera region is as indicated in Chapter Five, Table 5.16 under Section 5.4.7 and it requires integration of information and material flow through these partners from source to user. The proposed model for the region is related to the three major stages of the chain (producers, processors and marketers).

Since coffee SCM is crucial for the social and economic development of Kagera region, many coffee management organisations are part of this supply chain. They have to perform well to achieve better coffee delivery to consumers. This requires interfacing between techniques across applications and individual players. In the context of this study, the list of actors comprises of coffee growers, processors, auction, wholesalers, exporters, retailers and service providers including transporters and other material suppliers. Employing the proposed coffee SCMM for in the region can bring such interfacing and efficient coffee management system. Using an integrated approach also will enable organisations to go into e-commerce with business-to-business procurement and sales. This can provide visibility of coffee components involved as well as control over the coffee supply chain. Thus, the adoption and implementation of the proposed model will benefit many organisations in the region.

The coffee SCMM for Kagera is a typical conceptual model which is likely to benefit when implemented with some modifications in the existing coffee management processes. The model requires an integration of all the components using component relationships at the operational level. The integrated framework for coffee supply chain will contribute to the knowledge of potential improvements in the coffee industry in Kagera region. The model is structured in such a way that the supply chain processes and systems are monitored by the unitary structuring technique. As such, it is a framework or a foundation for development of coffee industry in Kagera region.

7.7 Coffee Supply Chain Processes and Systems

Literature indicates that a supply chain is a network of autonomous or semiautonomous business entities in the upstream and downstream links. It encompasses different business processes and activities that produce final products or services to customers. With respect to this study, the coffee supply chain consists and coordinates a series of activities undertaken by various coffee management organisations in order to deliver value, either in the form of a product, service, or a combination of both, to its customers. In addition, the coffee supply chain is considered as an integration of materials and information flow among customers, marketers, coffee processors, producers and suppliers of different services as reflected in Figure 5.11. The proposed conceptual coffee SCMM emphasises the benefits of vertical integration including common sourcing of services (economies of scale) such as access to capital, and large physical coffee management infrastructure, quality assurance and inspection services. Likewise, the Model focuses on the benefits of being specialised expertise such as speed, agility, and rapid growth. This is the reason the study sees that

coffee SCMM for Kagera can also be replicated in the supply chain models for other cash crops such as tea, sisal, pyrethrum, cashew nuts, cotton, and tobacco in Tanzania.

The importance of coordinating and managing various coffee activities (production, processing and marketing) among distinct entities requires a well designed coffee SCMM like the one proposed in this study. Therefore, the proposed model recommends the TCB to be an overseer body for the management and coordination of processes and system of the entire coffee supply chain in Kagera. Such arrangement is what is referred to as “Coffee Supply Chain Management”. Therefore, TCB will be the chief supervisor of the process that involve a number of sub-processes such as plan for sourcing of basic coffee services, operations and processing planning, sales and demand management, customer order management, control and execution, materials, quality and inventory management, material procurement, coffee distribution requirements planning, transportation and shipment management, and an integrated coffee supply and demand planning.

Since processes in a coffee supply chain involves a large number of components, including coffee growers, planners, processors, marketers and customers, management of these components by use of the proposed coffee SCMM seems to be a challenging task than before. This is due to mistrust among the key players with common interests such as inter-regional traders and exporters. Therefore, the proposed model represents additional features beyond logistics including a chain of exchange of information (feedback) initiated by the coffee consumers (information flows from consumers through marketers, processors to coffee growers). Other features are the inclusion of an integrated coffee supply chain planning and recommending TCB as overall coordinator of the entire coffee supply chain as reflected in Figure 7.5. This study views that it is necessary to improve the planning and management of interrelated systems such as sourcing planning, inventory management, and capacity planning and production management within the coffee supply chain. Thus, the types of coffee seeds to be planted should be agreed between coffee growers, processors and consumers. Thus, it requires integration of the players responsible for each activity and the external suppliers and customers who are part of the integrated coffee supply chain planning and execution process. The goals are to achieve speed-to-market, agility, and flexibility to respond more quickly to the coffee customer demands, while keeping cost at a minimum.

As mentioned above, integration of all components within and outside the conceptual model may cause several challenges. The study has identified some significant barriers in the coffee SCMM for Kagera Such

as lack of trust among coffee players especially between coffee growers and coffee buyers, with inter-regional traders and exporters as good examples. Mistrust occurs because some of the actors have an eye for super profit. Such barriers may result in unnecessary antagonism among them. However, this study has proposed the governance structure whereby the TCB will always oversee and harmonise relationships among coffee chain actors in Kagera. This is unitary structuring technique in integrating many components at the structural level in order to utilise fully the benefits of the coffee supply chain.

7.8 Why Propose an Appropriate SCMM for Kagera?

As indicated in section 7.2, conceptual models are not explanations of phenomena but they are structures that have been developed to represent the characteristics of real world problems. However, there is general agreement that integrating the flow of goods or services to customers makes eminent business sense, most organizations have a difficult time assigning a quantitative payback figure to this exercise. This is one of the biggest challenges facing coffee SCM in Kagera. Consequently, coffee management organisations in the region need this kind of quantification to invest in the development of coffee SCM model. The reported bottom-line benefit centre on reduced costs in the areas of inventory management, transportation, and warehousing and packaging, improved service which result from supply chain related achievements. This is the reason the study sees the importance of proposing the coffee SCMM for coffee in Kagera region. Likewise, the development of an appropriate conceptual coffee SCMM for Kagera region is due to the fact that SCM is the extent to which supply chain partners work cooperatively to achieve mutually beneficial outcomes. This study recognises that there is pure inadequacy in the application of SCM principles in the coffee supply chain in Kagera (see Table 5.17). It regards SCM as a key tool that seeks to create sustainable value for coffee from Kagera.

In addition, the development of an appropriate conceptual coffee SCMM for Kagera is from the conclusions made in Chapter Six, section 6.3 whereby this study proves that:

i. Coffee marketing support activities and services are not significantly linked to production and processing support activities and services in order to allow application of SCM principles because they are partially linked.
ii. Coffee management institutions partially provide mandatory services to enable farmers undertake production, processing and marketing support activities and services for this crop.
iii. Since only two marketing support activities and services are integrated and the rest are not, the study has sufficient evidence that marketing support activities and services ARE NOT significantly integrated in the supply chain in order to enhance coffee marketing in Kagera.

Likewise, through Chapter Six, Section 6.4 the study proves that:

i. Coffee production, processing and marketing support activities and services are not significantly linked so as to allow application of coffee SCM in Kagera.
ii. Integration of coffee marketing support activities and services in the supply chain is partially articulated. Thus, marketing support activities and services are not fully integrated to enhance coffee marketing in Kagera.
iii. Coffee management institutions do not provide all mandatory services to enable farmers undertake coffee production, processing and marketing support activities and services for this crop in Kagera.

Thus, the study proposes development of an appropriate conceptual coffee SCMM specific for Kagera which has basic fundamentals different from the existing model as reflected in Table 7.1:

Table 7.1: Comparison of the Existing and Proposed conceptual Coffee SCMM for Kagera

Reference	The Existing Coffee SCM Model in Kagera	Proposed Coffee SCM Model for Kagera
Table 5.9 and 6.0 in sections 5.3.2 and 5.3.3 respectively	No Integrated Coffee Supply Chain Planning mechanism. Coffee production, processing and marketing are undertaken without integrating consumers' opinion.	There is Integrated Coffee Supply Chain Planning for all activities within the supply chain. The feedback from consumers is coordinated and integrated in the planning.
Table 5.10 under section 5.3.3	Only Tanzania Coffee Board (TCB) coordinated the coffee marketing services	TCB no longer coordinating marketing services. Instead, it remains with policy formulations and regulation of coffee industry (Governance)
Section 5.3.2 and Table 5.9	Cooperatives and private traders were the only coffee buyers and processors	Cooperatives and private traders are not the only coffee buyers but processors and inter-regional traders in addition to also to buy coffee directly from farmers.
Section 5.3.3 and 5.4.3	TCB had the overall responsibility of overseeing coffee marketing especially its export	TCB has no responsibility of overall overseer of coffee marketing whereby Cooperatives and private sector to directly buy and market /export coffee
Table 6.3 under Section 5.3.6	Government only had responsibility of collecting and disseminating marketing information	Private sector has replaced the Government in the responsibility of collecting and disseminating marketing information
Table 5.3 under Section 5.1.2	Three line ministries (Ministry of Agriculture Food Security and Cooperative, Prime Minister's Office-Regional Administration and Local Government (PMO-RALG) and Ministry of Industries and Trade) were responsible for coffee management	Instead of three line ministries, coffee management is under the Agribusiness Coordination Unit in the Tanzania Agricultural Council under the Ministry of Agriculture, Food Security and Cooperative only.
Table 6.4a under Section 5.3.7	Components work independently in securing basic coffee services such as supply of input, coffee storing bags, equipments, quality control, inspection and audit services	Components are no longer working independently. Instead sourcing for basic coffee services are planned and procured through procurement procedures in order to enjoy economies of scale of the supply chain

The coffee supply arrangement in Kagera explained in Table 7.1 is presented in Figure 7.3;

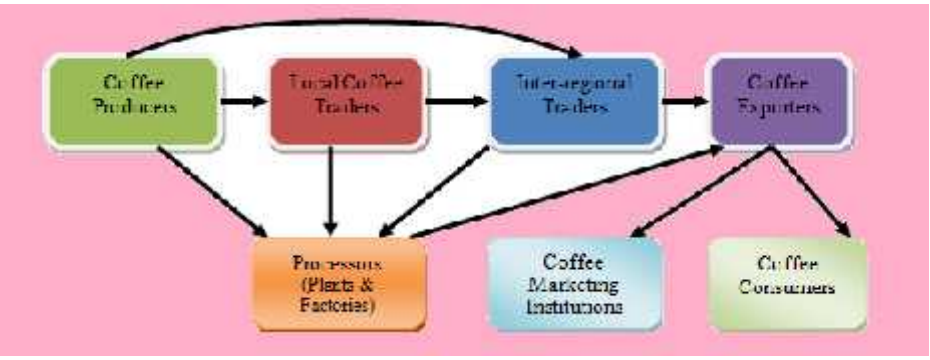

Figure 7.3: Coffee Supply Chain Arrangement for Kagera

In view of respondents' opinions in Chapter Five, Table 5.11 under section 5.4.3 and others in Section 5.4.7, the study proposes to abolish the confinement of TCB in the marketing services only so that it can now undertake the responsibility of being an overall supervisor of the entire coffee supply chain in Kagera and the country at large, policy formulation and chief regulator of coffee industry by enforcement of ammendiments to be made to the Coffee Industry Act, 2001. Designing a SCMM often needs analysis tools that can estimate its system performance at the design stage. An analysis tool for supply chain systems should, at least, provide the following general system performance measurements.

i. Resource utilization rates: This measurement is used to judge whether the system has enough resources to execute given tasks or not. A resource with high utilization rate indicates that the workload on the resource is comparatively high. If a particular resource indicates higher load than other system resources, it can be a bottleneck causing inventories to build up.

ii. Waiting queue length: Any SCM systems can be recognized as process network systems providing services to entities. The process is probably a manufacturing cell, a transporter delivering products to customers, or a computer system recording order forms from customers. These objects often generate queues when a particular server resource is busy.

iii. Throughput rate: This is the number of entities that finish service during unit time at an individual process or the system. This is often called the service rate of the system. This value represents process performance of the server under observation.

iv. Elapsed time: This is the amount of waiting time that entities wait until the server is available and the service time that entities receive services from servers. This measurement is often called lead-time in manufacturing systems.

7.9 The Existing Coffee Supply Chain Management Model in Kagera

The current coffee SCMM in Kagera is as illustrated in Figure 7.4.

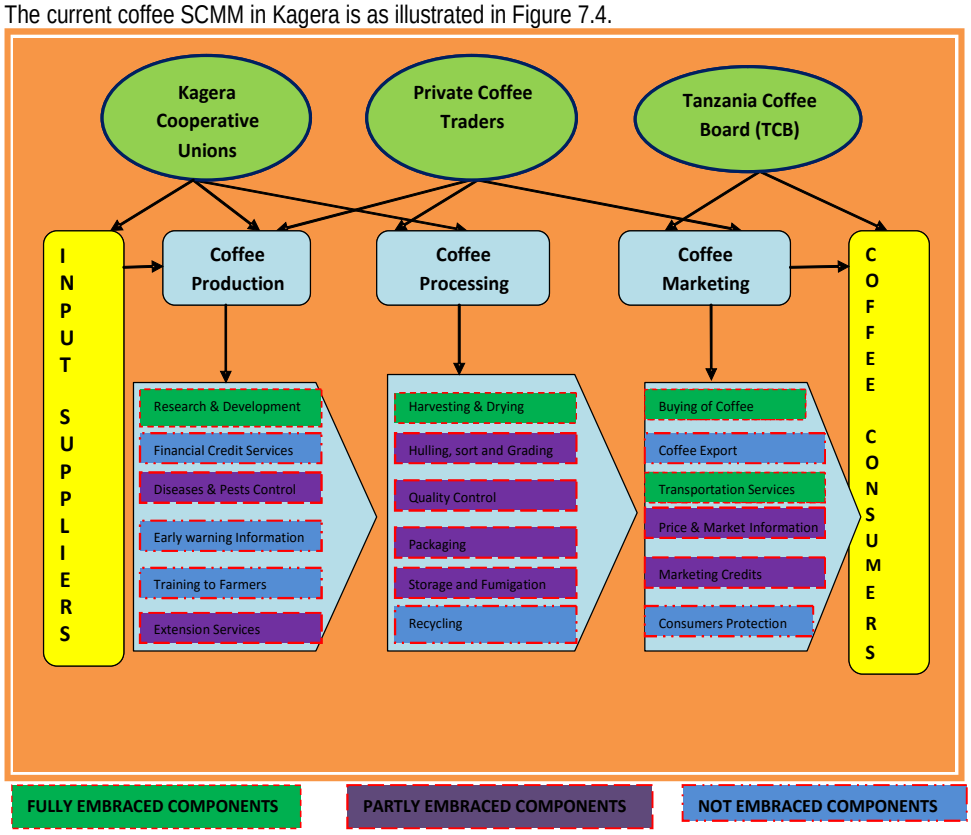

Figure 7.4: Existing Coffee Supply Chain Management Model for Kagera

NOTE: Not all core coffee production; processing and marketing services are reflected in the existing conceptual model in Figure 7.4 above.

In the existing conceptual coffee SCMM in Kagera as presented in Figure 7.4, the cooperative unions, private coffee traders and TCB are the major players each working independently. While the operations of the cooperative unions are confined to coffee production and processing only, the private traders are

authorized to production, processing and marketing services and TCB are restricted to marketing (export) only. This means the whole system is restrictive and can neither promote competition nor partnership among actors to enhance efficiency. Thus, the existing coffee SCMM is contrary to the general theory of SCM. In view of this situation, the existing model has the following weaknesses:

i) The operations are not guided by the formal plan for the entire coffee supply chain;
ii) There is no official feedback mechanism to the preceding actor in the supply chain;
iii) Unlike other supply chains, it has no recognized body to oversee the entire supply chain in order to ensure governance and harmonise processes and systems;
iv) Each major component or actor works independently thereby lacking economies of scale and synergism; and
v) The existence of three different line ministries responsible for coffee production, processing and marketing respectively is confusing.

7.10 The Proposed Coffee Supply Chain Management Model for Kagera

The proposed appropriate[27] conceptual Coffee SCMM for Kagera will allow coffee management organizations to realize the advantages of forward and backward linkages as well as vertical and horizontal integration while enjoying all its advantages. However, certain conditions must be accomplished for a successful coffee SCMM adoption in Kagera. The most important prerequisite is the creation of trust among players in the coffee supply chain in Kagera. Another prerequisite is the change in the corporate cultures of all members in the coffee supply chain by creating cooperative spirit among then which is desirable safe landing floor for the coffee SCMM to smoothly operate. A proposed conceptual model as reflected in Figure 7.5, lies on the traditional culture that emphasizes the seeking good, short-term, company-focused performance and focuses on planning such a way that all its contributors benefit. Furthermore, itrests on the twin pillars of trust and communication among actors and common logistics which are equipped with the necessary expertise in their key functions in the entire coffee supply chain. Thus, the development of coffee SCMM for Kagera owes much to the weaknesses of the existing model and inclusions in the proposed model as outlined in Chapter Six, Table 6.1. The basic idea is to spearhead effective and efficient management of coffee production, processing and marketing under minimum costs while delivering superior products to the satisfaction of coffee consumers.

27 The Model is termed appropriate as it is the most preferred and suggested by the majority of respondents of the study.

For an adequate implementation of the proposed coffee SCMM in Kagera, TCB should be the central overseer or chief administrator in order to ensure full commitment by all members of the coffee supply chain and general governance guided by the policies and the Coffee Industry Act, 2009. This proposal comes from the theory of SCM whereby the some actors on one side are required to overhaul their operations process and integrate the processes of others on the other side. In the context of this study, the buyers of coffee are required to overhaul their processes and systems in order to integrate the coffee growers and processors into their decision-making process and the same to other key players. In this regard, the trust among players of the coffee supply chain is a prerequisite for profitable business. However, there are other pitfalls of coffee SCM, such as conflicting objectives and mission, inadequate definition of customer service, and separation of coffee supply chain design from operational decisions. Synergy among players will allow coffee from Kagera to be delivered to customers in a timely and less cost way.

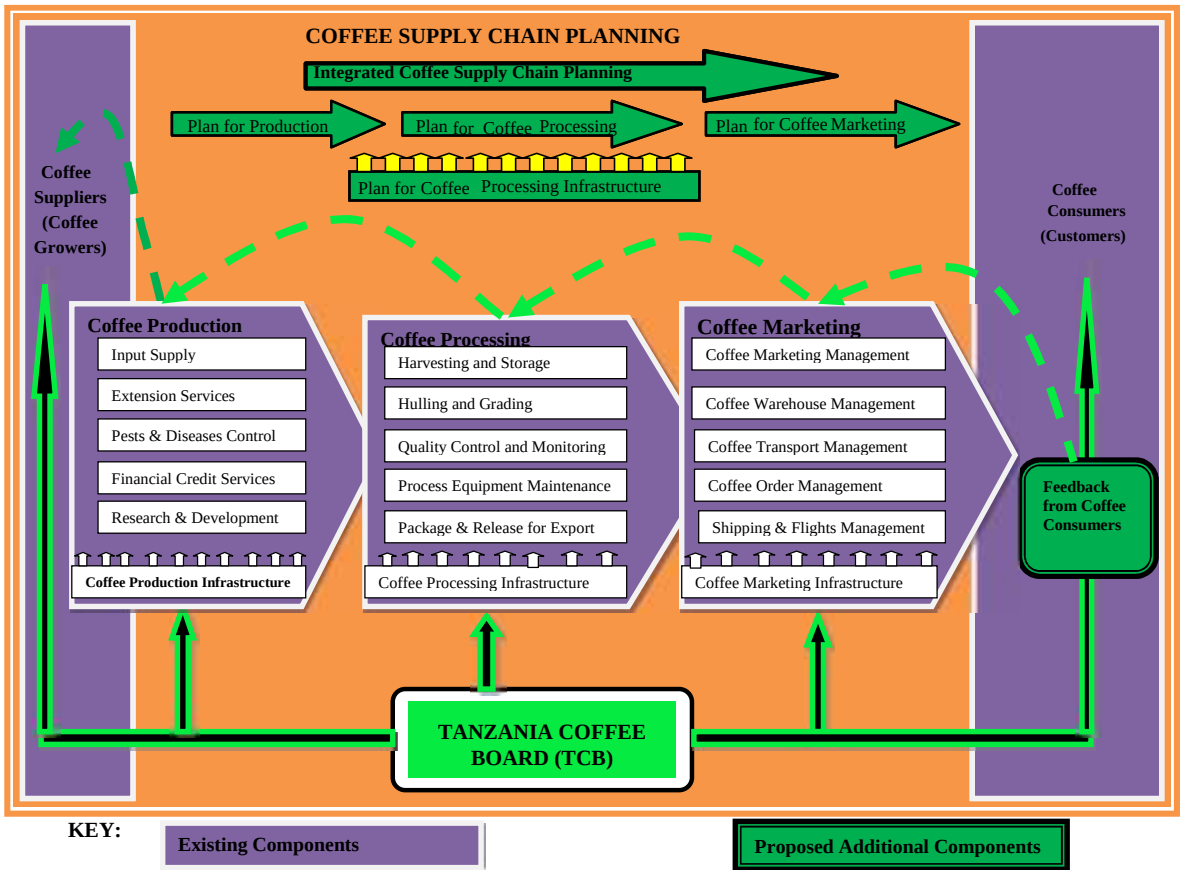

Figure 7.5: Coffee Supply Chain Management Model (SCMM) for Kagera Region

Coffee production, processing and marketing services as reflected in Figure 7.5, are not exhaustive but just representative of the long list of activities. In this regard, the entire operation of the coffee SCMM above is the outcome of Integrated Coffee Supply Chain Planning (ICSCP) in terms of planning for sourcing, coffee processing, marketing and the entire coffee supply chain. The coffee SCMM will be guided by the Integrated Coffee Supply Chain Planning and coordinated and supervised by the TCB in terms of governance, linkages of actors and linkage with the government in terms of policies and regulations. Coffee consumers will initiate the feedback and each actor in the respective component of the coffee supply chain will receive a feedback regarding the specific area it participates in the supply chain (the feedback is indicated by the red arrow). The exchange of information (feedback) is necessary for ensuring delivery of superior coffee product and improvement of the operations of the supply chain according to the specifications of the consumers and other participants of the supply chain. In so doing the conceptual model is in line with the fundamentals of the theory of SCM.

From the above conceptual model, the main goal of coffee SCMM is to provide coffee management institutions in Kagera region with common terminologies, perspective, and benchmarks, first to describe and then to configure their coffee supply chains. The conceptual coffee SCMM for Kagera breaks down the coffee supply chain into four key management processes: planning, sourcing, processing, and marketing.

i) Planning: encompasses balancing of aggregate coffee demand and supply to develop a course of action so as to meet the preferred business targets. The specific activities include assessing resources supply; aggregating coffee demand requirements, planning inventory and distribution requirements, and assessing coffee production, processing and marketing and quality of all coffee products and all channels. Plan also involves managing the planning infrastructure, make sales decisions, resource and business planning.

ii) Production: encompasses processes selecting of suppliers of various inputs such as coffee seeds and seedlings, pesticides, fertilisers, early weather information and other tools. Other activities are selection of coffee experts for quality control and certification and contracts negotiations to meet planned and actual demand for production. It includes common procurement and managing of production infrastructure such as mechanisation technology, coffee quality assurance and coffee irrigation infrastructure.

iii) Processing: covers all processes that transform coffee to various types of finished products such instant coffee and hard coffee to meet planned or actual demand for export. It includes managing the production execution activities, resources, and infrastructure.

iv) Marketing: incorporates all processes that provide finished coffee products to meet planned or actual coffee demand. It includes coffee order management, warehouse management, transportation, and installation management. Deliver involves managing the coffee deliver infrastructure, coffee channel business rules, order rules, deliver inventories, and export of quality coffee products.

7.11 Core activities of the Coffee Supply Chain Management Model for Kagera

The core activities of the proposed conceptual coffee SCMSCMM are as outlined in Table 7.2:

Table 7.2: Core Activities of Coffee SCMM for Kagera Region

COFFEE SUPPLY CHAIN PLANNING:	COFFEE MARKETING:
Coffee Demand and Supply Planning - Assess coffee supply resources - Aggregate coffee demand requirement - Plan inventory and distribution requirement - Plan coffee production, processing, marketing and quality for all products and channels	Coffee Demand Management - Forecasting of coffee demand - Coffee sales campaign and promotions - Export programme planning - Collecting and analyzing coffee demand and sales - Coffee price planning - Coffee customer's satisfaction evaluation - Execution of efficient customer response
Plan Infrastructure - Coffee processing and sales decisions - Coffee supply chain configuration - Long-term capacity and resource planning - Entire coffee business planning (production, processing and marketing)	Coffee Order Management - Enter and maintain coffee orders - Generate quotations - Configure coffee products - Create and maintain customer orders - Manage allocations Vs orders - Manage accounts receivables, credit and collections
COFFEE PRODUCTION SERVICES:	Coffee Warehouse Management - Receive and stock final coffee products - Pick and pack - Kit configured coffee products - Shipping of coffee products - Create customer-specific coffee labelling and packaging - Consolidate coffee orders for shipping
Production Activities - Coffee input supply and distribution (e.g. seedlings, fertilisers and harvesting bags) - Inspection, Pests and diseases control - Extension services and training - Financial Credits services - Research and Development	
Production Infrastructure - Certification of coffee production technology - Coffee quality assurance - Coffee irrigation technology - Coffee human and physical infrastructure - Agro-mechanisation coffee specific	Coffee Transport Management - Manage traffic - Manage freights - Coordinate coffee export processes
COFFEE PROCESSING	
Production Execution - Request and receive coffee consignment - Process and test coffee products - Coffee package and release for export	Deliver Infrastructure - Channel business rules - Coffee orders rules - Manage deliver inventories (finished coffee products) - Construction of quality coffee warehouses (stores) - Jute and sisal bags for coffee export
Infrastructure - Implementation of processing services - Facilities and equipment maintenance - Coffee processing monitoring and control - Coffee quality assurance	

7.12 Coffee SCMM Implementation Steps

There is no proven path for implementing the proposed conceptual coffee SCMM. There are so many operational and strategic facets to coffee SCMM that any given implementation can take an infinite variety of forms, progress through radically different stages, and result in several different outcomes. However, coffee SCMM implementation in Kagera shall focus on the key steps including, assessing coffee supply chain opportunities, developing a coffee SCMM vision, developing a coffee SCMM strategy, creating the optimum coffee SCMM organizational structure, translating the coffee SCMM strategy into actions, and establishing the coffee SCMM information and communication network. Steps of Implementation of coffee SCMM in Kagera are as shown in Figure 7.6

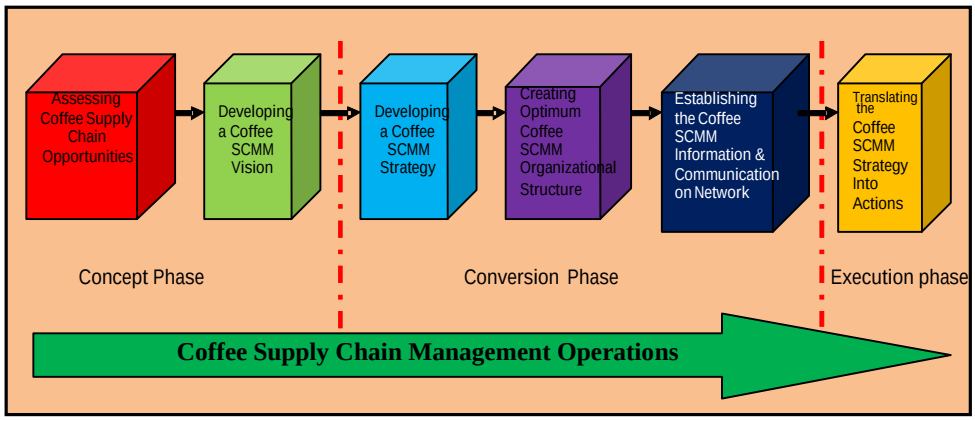

Figure 7.6: Coffee SCMM Implementation Steps

While coffee management organizations (primary societies, unions, private traders, farmers' associations, coffee hulling factories and TCB) in Kagera can modify the sequence and emphasis placed on these steps to meet the needs of a particular situation, these activities are recommended as a guide for implementing coffee SCMM. These steps are illustrated in Figure 7.6.

7.12.1 Assessing Coffee Supply Chain Opportunities

An effective way to begin assessment of coffee supply chain opportunities in Kagera is by forming an organization-wide steering committee that will oversee all related coffee production, processing and marketing activities in the region and its challenges, and then approve final recommendations and implementation plans. To spearhead the opportunity assessment effort, the creation of a supply chain assessment team that works under the aegis of the steering committee is recommended. The assessment

team should comprise strong operations people with appropriate skills and passion for improved coffee management system.

7.12.2 Developing a Coffee SCMM Vision

Visioning shall provide coffee management authorities in Kagera with specific goals and strategies on how they plan to identify and realize the opportunities they expect to find in the coffee supply chain especially at coffee market. Coffee Supply chain visioning will be most successful when it is customer focused, strategy driven, and outcome based. Specifically, the supply chain vision for Kagera should be built from a clear understanding of coffee customer needs and how well the proposed SCMM is meeting those needs. Four critical dimensions to be included in formulating a coffee SCMM vision for Kagera are sourcing, demand flow, customer service, and supply chain integration. These objectives will be achieved through careful analysis, collaboration, and communication among supply coffee supply chain partners. Each dimension of the visioning process shall bring new perspective and progress toward these objectives.

7.12.3 Developing a Coffee SCMM Strategy

The proposed coffee SCMM strategy shall create economic value for the coffee customers. It will also provide a win-win situation for both the coffee producers and coffee value-adding participants, creating growth opportunities for each participant. The ultimate goal to develop a trust-based relationship among all parties is based on a system of mutual support, effortand benefit. In this regard, the strategy of coffee SCMM for Kagera will be for the provision of a clear direction for the coffee supply chain and support the identification of awareness and dedication to the underlying vision and objectives of the coffee supply chain network. Thus, an expansion of the coffee SCMM strategy to reflect detailed coffee channels strategies will provide the means to develop performance metrics, feedback, evaluation and improvement initiatives.

7.12.4 Creating the Optimum Coffee SCMM Organizational Structure

Creating the optimum coffee SCMM organizational structure refers to defining how the coffee customers' needs will be met at each stage of the coffee supply chain operation, as well as who among the participants can best fulfil that need. The role of each partner within a coffee SCMM organizational structure in Kagera should be static. As new customer segments are identified or new channels are developed to serve current customers of coffee products, the network structure and the role of participating organizations should have to change. In some cases, new participants with new and specialised skills, such as electronics or global

reach, may be recruited. If this is done, the entire network should be reconfigured to ensure effective integration of new players and skills.

Effective Coffee SCMM organizational structures require several elements. To begin with, the internal structures of the organizations shall be flat, provide for players empowerment and be cross-disciplinary., Coffee SCMM shall rely on the configuration and empowerment of cross-channel process teams targeted at achieving channel strategic objectives and continuously creating innovative sources of customer value. Within coffee SCMM, interdependence and teamwork shall be built into all the participants. Linked to each other through vision, strategy, structure, and operations, coffee supply chain partners in Kagera shall learn and keep each other's trust. Optimization of the coffee SCMM organizational structure shall, therefore, require an advanced form of partnering that relies on openness, communication, and the use of the best improvement tools and techniques available to gain the quantum performance enhancements required to create and sustain region's coffee competitive advantage.

7.12.5 Establishing the Coffee SCMM Information and Communication Network

The thread that draws channel partners together is a common objective and its communication. Information, the tools and technologies that create it, provide the means to bridge organizational boundaries and support inter-organizational learning. The development of a robust information and communication network in Kagera shall support coffee SCMM participants in achieving several critical coffee supply chain requirements.

The coffee SCMM information and communication network for Kagera shall be divided into three stages namely:

a) Transactional—electronic execution of transactions;
b) Information-sharing—electronic sharing or exchange of information; and
c) Collaborative—electronic collaboration on strategic, tactical, and operational planning.

7.12.6 Translating the Coffee SCMM Strategy into Actions

All coffee management institutions in Kagera shall be required to implement a specific aspect of the coffee SCMM strategy spanning coffee from its production to final consumption across an array of different organizations or functional groups. A range of actions required for all partner organizations include

a) aligning culture with strategic response;

b) developing critical business processes;
c) monitoring performance;
d) developing and training the workforce;
e) communicating and demonstrating senior management commitment;
f) involving coffee stakeholders and gaining commitment to change;
g) implementing a system to track benefits to coffee stakeholders;
h) creating an integration coffee supply chain map.

7.13 Supply Chain Planning Challenges

Many system designers and managers face different challenges during the designing, planning and operating of a supply chain system.. The challenges are interlinked and are categorized into two major groups, namely primary as well as secondary challenges as elaborated below:

7.13.1 Primary Challenges

i. Capacity Planning Challenges

Capacity planning is a process that determines the amount of capacity required to produce in the future. This function includes establishing, measuring and adjusting limits or levels of capacity. Generally, this planning includes the process of determining in detail the amount of labor and machine resources required to accomplish the tasks of production. In traditional systems (a planning support system for a single factory), there are two methods to estimate and plan the system capacity. One is called Rough-cut capacity planning (RCCP) and the other is called capacity requirement planning (CRP), which is a name of a sub-module included in typical traditional systems.

The RCCP is the process of converting the master production schedule into requirements for key resources, often including labour, machinery, warehouse space, suppliers' capabilities, and, in some cases, money. The master-schedule items and quantities are multiplied by the total time required to build each item to provide the total number of hours to produce the schedule. Historical work-centre percentages are then applied to the total number of hours to provide an estimate of the hours per work center to support the master schedule. Comparison to available or demonstrated capacity is usually done for each key resource. This comparison assists the master scheduler in establishing a feasible master production schedule. Similar to RCCP, the CRP module estimates workload on each work centre in factories but at a more detailed level.

In this case, open shop orders and planned orders in the traditional system are input to CRP. It uses parts routings and time standards to translate into hours at work centres by time period.

These methodologies are also applicable to the supply chain systems. These are, so to speak, RSCP andSCRP. The challenge for the former is about how much capacity individual suppliers should provide to meet the long-range demand mean These are, for example, number and types of supplier plants, the location of the suppliers, manufacturing capacity of suppliers, the location and capacity of warehouses for transportations, type of manufacturing plants and warehouses, and so on.

- What workload each supplier should handle?
- How much of the raw materials and products should be prepared for shipping?

The examples for the latter are:

- Which suppliers would be the bottlenecks when a particular shipment plan is given?
- When and how much production capacity does each supplier need?
- When does the market demand reach its peak point during a certain time period?
- How much of demand should be supplied from inventory and from production?

ii. Resource Planning

Resource planning is capacity planning conducted at the business plan level. It is the process of establishing, measuring and adjusting limits or levels of long-range capacity. Resource planning is normally based on long-term production plans but may be driven by higher level plans beyond the time horizon for the production plan, for example, the business plan. It addresses those resources that take long periods of time to acquire. Resource planning decisions always require top management approval.

iii. Lead-time Planning Challenges

The term “Lead-time” has basically two meanings: a span of time required to perform a process (or series of operations) and the time between recognition of the need for an order and the receipt of goods. The second one is often used in a logistics context. Individual components of lead-time can include order preparation time, queuing time, processing time, move or transportation time, and receiving and inspection time. We use this term in this paper with its second meaning. This problem directly impacts the inventory planning problems through the Lead-time inventory, the inventory that is carried to cover demand during the lead-time.

The examples of this class of challenges are:

- When and what should suppliers produce, and associated due dates?
- When and how much volume of products or component parts should be transported?
- Which transportation channels should be used?
- What impacts do occur on the total lead-time in the chain?

iv. Production Planning Challenges

There are two phases of production planning: the first phase is an aggregate production planning and the second phase is an operational production planning. An "Aggregate production plan" implies budgeted levels of finished products, inventory, production backlogs and plans and changes in the work force to support the production strategy. Aggregate planning usually includes total sales, total production, targeted inventory and targeted customer backlog on families of products. One of the primary purposes of the aggregate production plan is to estimate the production rates, when the system works according to the given plan. The production rate is an important decision parameter since it determines whether the system is meeting its' management's objective of satisfying customer demand while keeping the work force relatively stable. As the production plan affects many company functions, it is normally prepared with information from marketing and coordinated with the functions of manufacturing, engineering, finance and materials. It is the function of setting the overall level of manufacturing output (production plan) and other activities to best satisfy the current planned levels of sales (sales plan or forecasts) while meeting general business objectives as expressed in the overall business plan such as profitability, productivity, competitive customer lead times, and so on. The sales and production capabilities are compared, and a business strategy that includes a production plan, budgets, pro forma financial statements, and supporting plans for materials and work force requirements, is developed.

Operational production plan is a more detailed set of planned production targets that meet the goal of the higher level manufacturing output plan. It is based on an agreed-upon plan that comes from the aggregate (production) planning function. It is usually stated as a monthly rate for each product family. Measurement units depend on the plan and the products, such as units, tonnage, standard hours, and number of workers. The production plan is management's authorization for the master scheduler to convert it into a more detailed plan, that is, the master production schedule.

7.13.2 Secondary Challenges

i. Supplier Selection Challenges

When a system planner designs a supply chain or a manager reviews performance of the existing supply chain one of the major challenges is the supplier selection problem. From the supply chain performance viewpoint it affects all the primary problems discussed above. Examples include the following:

- Which supplier is the best to produce and distribute?
- What inventories should be managed by the supplier?
- Where and how much inventories should be stored?
- What is the amount of inventory to be held at the plant?
- What response time should be expected from the supplier?

ii. Outsource Planning Challenges

Outsource planning is one of the very important problems for modern manufacturing enterprises. This is because maintaining expertise in all the technologies and processes required for manufacturing a product is almost impossible in single company. In addition to that a proper outsourcing of process lets a company concentrate its resources on particular core processes, allowing the company to maintain its competitive position. The outsourcing decisions impact all the challenges discussed above and thus impact the supply chain performance. Examples are as follows:

- How to determine the set of suppliers for outsourcing and how to select a supplier from the set
- How to choose between third party logistics or self-transportation
- How to link the two processes of internal and external production planning

iii. Operational Strategy Selection Challenges

This challenge includes selecting the strategy to operate the supply chain. When the supply chain designer has solved the primary problems, has selected the best business partners as the suppliers and has decided the non-core processes to be outsourced, such selection still needs to decide how to control the flow of products through the supply chain. The challenges to be encountered include the following:

- How to choose between PUSH, PULL, and Hybrid PUSH-PULL
- How to choose the strategy at each stage of the supply chain

7.14 Conclusions

This Chapter has presented the proposed conceptual coffee SCMM for Kagera which integrates key components of the coffee supply chain. However, most of scholars appreciate the integration aspect of the SCM principles. Having identified the need and the current level of development, this study has developed a hypothetical appropriate coffee SCMM in order to coordinate key players, processes and systems for the integrated framework. The proposed model is based on the unitary structuring technique, which has been successfully implemented in many successful coffee management systems. The conceptual model for Kagera integrates various participants involved in the entire coffee supply chain including coffee producers, processors and exporters. Its main features include the integration of individual components, elimination of inefficient structures and proposal of TCB as the overall coordinator. The model proposes the elimination of interfacing steps among the supply chain partners and provision of an integrated approach for the coffee supply chain. It also proposes the information exchange among players (feedback) initiated by consumers in addition to integrated coffee supply chain planning. Finally, the model is capable of providing visibility, flexibility and maintainability for further improvement in the coffee supply chain.

CHAPTER EIGHT

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

In the preceding seven chapters the study presented an introduction and background information of the study, theory and practice of SCM (literature review), the model development and research methodology. It exolained how the study collected qualitative and quantitative data, adopted descriptive analysis, conducted synthesis and analysis and finally came up with research results that successfully responded to all the research questions, propositions and objectives of the study and attained. The chapter reported on the examination of the existing coffee SCMMi n Kagera region and the shortcomings found and how it pproposed the appropriate conceptual coffee SCMM for Kagera and the necessary and appropriate steps for its implementation. This chapter presents the summary of all previous chapters, provides general conclusions for this study and recommendations.

8.2 Summary of Findings

The following is the summary of the findings of this study related to coffee production, processing and marketing support activities and services, which attributed to development of the proposed conceptual coffee SCMM for Kagera region.

8.2.1 Coffee Production Support Services

The findings revealed that there was inadequate application of CM in the production support activities and services for the coffee sub-sector in Kagera, implying that SCM was not being applied to some key activities of coffee production. Regarding production and production pattern, the study revealed that it was decreasing. The production decrease was associated with low prices offered to coffee, which led to persistent poverty among the majority rural population whose income for livelihood depends on coffee.

With regard to provision of coffee production support activities and services, the study revealed that the supply chain is incomplete. It is fragmented in the sense that the provision of some services including input supply, financial facilities and extension services, are not adequate or not provided at all. While farmers are dissatisfied with the services provided to them except on research and development, pests and disease control as well as dissemination of improved seeds, workers are satisfied with services provided by the

supply chain except the extension services, financial and input credit facilities and training. However, the study discovered lack of synergy among core production activities.

8.2.2 Coffee Processing Support Services

The study established that the processing of coffee in Kagera has improved following the active participation of the private sector compared to the last decade. Post harvest loss was estimated at 15 % compared to 30% fifteen years ago which is due to improvement of processing facilities.Most of the constraints facing agro-processing are within the ability of the region to arrest. While processors are encouraged by the current pace of growth of processing, workers in government services and crop authorities are not satisfied with the level of coffee processing. However, the study learnt that workers are influenced by their positions in their organisations and not the reality. The analysis also revealed that the negative attitude indicated by workers was due to the fact that such activities are currently undertaken by private sector following the introduction of market liberalisation. Analysis noted that most farmers sell their produce in raw form with little or no primary processing. However, the study has learnt that there is a high potential for coffee processing and value addition in this crop because vertical integration has increased investment along the supply chain, particularly in coffee processing.

As regardsthe quality control system, this study revealed that Tanzania is still at the infancy stage as it cannot guarantee protection to consumers against low quality coffee that result from poor processing and handling. Centralised quality assurance and quality control facilities at Tanzania Bureau of Standards (TBS) in the commercial capital city of Dar es salaam is a serious challenge that renders inspection of processing factories in other regions expensive but incomprehensive. Kagera region also lacks credible processors with modern technology and equipmentdue to lack of capital to establish them adequately to compete internationally.

8.2.3 Coffee Marketing Support Services

The study highlighted performance of coffee marketing institutions for coffee in Kagera. It revealed inadequate supply of marketing information, provision of marketing credits or guarantees and communications services in the supply chain. The inefficiency of these institutions fuels the existing challenges on marketing of coffee in Kagera region. The study noted that lack of financial support in terms of marketing credits or guarantees, coupled with inadequate dissemination of marketing information by

responsible institutions affects marketing of coffee. In addition to these, poor infrastructure and lack of modern technology and trained human capital disrupt marketing functions leading to decline in the volume of coffee production.

8.2.4 Application of Coffee Supply Chain Management Principles

The application of appropriate SCM has a significant influence on production, processing and marketing of coffee. This study noticed a partial (not adequate) application of SCM for coffee production and processing services except for the functions of buying and transportation. This is attributed to little attention given to production services especially poor provision of extension servicesand weak management of cooperative unions in marketing.

8.3 Conclusions

The study applied different research methods and instruments for collection of data to respond to the research questions, specific research objectives and research propositions. It focused on basic agricultural activities along the coffee supply chain from production to consumption. It involved the analysis of coffee production, processing and marketing so as to examine their influence on production and productivity of coffee in Kagera region. The overall objective was to determine the application of SCM and eventually propose an appropriate Conceptual SCMM in the coffee industry in Kagera.

After qualitatively and quantitatively analysed the data, the study concludes that coffee support activities and services in Kagera region are not significantly linked to production, processing and marketing to allow adequate application of SCM principles. Also, coffee management institutions, including private coffee traders, processors and exporters, cooperative unions, government regional and district agricultural offices have not rendered legimate support in serving coffee farmers. They do not provide all mandatory services to enable coffee farmers to undertake production, processing and marketing support activities and services. Finnaly, the study has gathered sufficient evidence that marketing services are not significantly integrated along the coffee supply chain to enhance its marketing.

The study proposes adoption of the appropriate conceptual coffee SCMM for Kagera region. The model has been developed in order to coordinate key players, processes and systems in coffee SCM for the integrated framework. The model is based on the unitary structuring technique (as indicated in Chapter Three, Section 3.7), which has been successfully implemented in many successful management systems. It integrates

various participants involved in the entire coffee supply chain including coffee producers, processors and exporters. Its main features include the integration of individual components, elimination of inefficient structures and steps, and proposing TCB as the overall coordinator. It further proposes an information exchange system among players (feedback) initiated by consumers. In addition, the model is capable of providing visibility, flexibility and maintainability of the coffee supply chain. Finally, the study proposes the replication of the proposed conceptual model to other cash crops such as cotton, tea, tobacco, cashew nuts and sisal. It also proposes further studies in the three separate areas namely SCM in production, processing and marketing in order to adequately gain an in-depth understanding about coffee supply chain.

8.4 Recommendations

The recommendations of this study are grouped into three major areas namely general recommendations, specific recommendations on coffee production, processing and marketing support activities and services and recommendations on application of SCM. In addition to this, the study presents recommendations on policy implications as a way forward.

8.4.1 General Recommendations

The following are general recommendations for the successful management of coffee supply chain in Kagera region:

i) A successful transformation of the coffee sub-sector in Kagera region depends much on supporting smallholder farmers of coffee to move from subsistence production to commercial coffee production. The government should, through the ACT, establish a special unit responsible for agricultural investment or business that will be charged with monitoring the provision of all basic agricultural services including coffee supply chain;

ii) Financial support is one of the main pre-requisites for the successful operations of the coffee supply chain. The government of Tanzania through the newly established Tanzania Agricultural Development Bank (TADB) should spearhead the financing of the coffee sub-sector in the areas of production, processing and marketing thereby the entire coffee supply chain;

iii) Some of the constraints facing the coffee sub-sector stem from the policy level. Remedial measures should be addressed in terms of policy formulation and implementation. Thus, the Agricultural Council

of Tanzania should make deliberate efforts to ensure that the government works like one system in a chain for coffee production, processing and marketing;

iv) The type and operations of the coffee SCMM for Kagera region should be piloted and replicated in other coffee producing regions in Tanzania. It should also be replicated for other cash crops in Tanzania such as cotton, tobacco, cashew nuts, sisal and Tea: and

v) The Coffee Industry Act, 2001 should be reviewed in order to accord TCB the new role of being the overall supervisor of the entire coffee supply chain

8.4.2 Specific Recommendations

The specific recommendations focus on coffee production, processing, marketing and support activities and services as well as the application of SCM in the coffee sub-sector as follows:-

a) Coffee Production

(i). Investing in coffee research and development should underpin the country's development agenda by supporting the private sector, research and development activities in agricultural research institutions and universities.

(ii). The ministry responsible for agriculture should accommodate research findings in the annual budgets and disseminate research findings to farmers; and

(iii). Commercial farming should be propagated and promoted as it would ensure research and development, input supply, advanced technology, pests and disease control as well as credit facilities to farmers.

b) Coffee Processing

(i) The government should facilitate primary processing at household level and improve the quality of coffee to acceptable international standards and grades.

(ii) Kagera is experiencing post harvest losses. Therefore, coffee processing should be a priority for adding value, creating employment and enhancing incomes of the farmers for poverty alleviation.

(iii) The government should foster power supply to rural areas in order to promote primary processing at farm level thus enabling farmers to sell quality coffee and fetch better prices.

(iv) Sustainable Industrial Development Policy (SIDP) should be put in place as a path for agro-industrialisation and enable Kagera and Tanzania to be semi-industrialised by the year 2025.

c) Coffee Marketing

i) The government should consider reviewing operations of TCB for it to focus on policy formulation and regulation of the coffee industry.

ii) Co-operative unions and private sector firms should undertake marketing function thereby drastically reducing the costs previously incurred by TCB and bringing about efficient coffee marketing system.

iii) Coffee marketing should be guided and monitored by the Agricultural Council of Tanzania. This will reverse the current situation where buyers of coffee dictate producer prices.

8.4.3 Application of Conceptual Coffee SCM Model

Appropriate implementation of the proposed conceptual coffee SCM model for Kagera region is crucial for increased market for its coffee. It should be regarded as an instrument for regulating and executing development process and an efficient coffee marketing system that can enhance the welfare of the coffee growers. Therefore, the study on coffee SCM is crucial for the knowledge about both technological, organisational innovation and markets; the ability to co-operate with partners or organisations and create win-win situation.

To revive coffee production and productivity in Kagera thus fostering its processing, marketing and promoting economic growth SCM should be aggressively propagated, promoted and adopted by the Kagera regional government and all stakeholders in the coffee industry. An appropriate SCMM should be developed, promoted and accepted by every stakeholder in the coffee sector in Kagera region. Evidences elsewhere in the world prove the roles played by SCM system in various aspects of economic development inthe agricultural sector.

8.4.4 Policy Implication

The study recognises the pivotal role of the application of SCM and its impact on coffee production, processing and marketing. The importance of the application of coffee SCM in determining the efficiency of economic, physical and social systems cannot be overemphasized. The study found that there are still

theoretical gaps and issues that have been brought to the surface for policy attention and probably need further research. The study noted that one of the major causes of poverty among most people in Kagera (rural areas) is poor performance of the coffee sub-sector particularly low production, poor processing and inadequate access to market. The study revealed that the supply chain for coffee is incomplete. It is fragmented in the sense that the provision of some agricultural services including, input supply, financial and credit facilities to farmers as well as extension services are not adequately provided and in some cases not provided to the required level. Despite this situation, quality control system seems unsatisfactory as it does not provide adequate protection to consumers against health hazards. Meanwhile, marketing information, provision of marketing credits or guarantees and telecommunication services are not well coordinated in the coffee supply chain. The study noted that lack of financial support affects marketing of coffee.

From these observations, policy makers, Kagera regional administration and all key stakeholders of the coffee industry should consider full integration of all public and private agricultural related services provided by all development sectors. Such services are infrastructure development, education, telecommunications, ICT, transport and financial credits.

8.4.5 Recommendations for Future Studies

The study had noted that the area of SCM in the coffee industry is very wide. It indicates that the coffee supply chain can be disaggregated into three major blocks of study from the entire coffee supply chain. Support activities and services are in the areas of production, processing and marketing. Therefore, this study proposes a study of each of these three major areasindividually as follows:

i. Analysis of conceptual coffee supply chain management: A case of production activities and services;

ii. Analysis of conceptual coffee supply chain management: A case of processing activities and services; and

iii. Analysis of conceptual coffee supply chain management: A case of marketing activities and services.

GROSSARY OF KEY TERMS

- Agribusiness: - Is the sum total of all operations involved in the manufacture and distribution of farm supplies, production operations on the farm, storage, processing, and distribution of farm products and items made from them to the market. It also refers to activities that include firms and economic enterprises organised to produce and sell services and supplies to farmers for use in farm production and farm living. It includes firms and industries that buy and process farm products and distribute them through the markets (farm service supply and agricultural processing and marketing industries).

- Agricultural Services: - Are activities that support agricultural production. These include training, research, extension, plant protection, irrigation, farm power or agro-mechanisation, credit facilities, storage, transport, processing, input delivery system, quality control and animal health and production.

- Agriculture: Is an industry covering the organisation of resources such as land, labour and capital in a wide variety of forms and management. It is primarily applied to growing of crops and raising of livestock. It also includes hunting, fishing and gathering of wild flora and fauna. For the purpose of this study, agriculture shall refer to production of crops, livestock, seeds, traditional irrigation, Co-operatives, marketing, extension services, agro-processing, veterinary drugs and rural roads.

- Agro-ecological Zone: - Is a major area of land that is broadly homogeneous in climatic and edaphic factors, but not necessarily contiguous, where specific crop exhibits roughly the same biological expression (Hella, 2003)

- Agro-industries: - The growing, storage, distribution, processing and marketing of biological products including food crops, non-food crops, livestock, fish and forestry products. In this study the concentration will be on the processors of agricultural produce (crops).

- Agro-logistics: - Is the application of logistics principles to the flow of products, half-products or raw materials in the agricultural sector operations.

- Agro-processing: Is the branch of manufacturing that transforms raw animal, crop, vegetable, or marine materials into immediate foodstuffs or edible products through the application of labour, machinery, energy and scientific knowledge. In agro-processing industries, various processes are used to convert relatively bulky, perishable and typically inedible food materials into ultimately more useful, concentrated, shelf-stable, and palatable foods or portable beverages.

- Appropriate Supply Chain Management Model- Appropriate in the context of this research work refers to the SCM Model that is proposed and preferred by most of respondents contacted by the researcher in this study

- Chain: - Is a network of autonomous and specifically named organisations, systematically co-operating in the production of some (related) products that can be directly, indirectly, linear or complex form.

- Chain Behaviour: - Interaction of the chain with its environment at a cognitive, an evaluative and an active level, as well as interaction between the constituting links of the chain.

- Chain Management: In the context of this study, Chain Management (CM) shall refer to the process of bringing order to the system of production, processing, distribution and exchange of agricultural

products to consumers. In other words CM is the integrated planning, co-ordination and control of all logistical business processes and activities in the agricultural production sector to deliver superior consumer value. Chain Management covers two main aspects:

- Management covering all links
- Management of individual links from the chain perspective

- Chain Strategy: -The set of statements and guidelines at the chain level with the purpose of guiding the future development of the chain and it links, and based on the shared ultimate goal of the chain.

- Conceptual Model: A simplified structure or diagram that shows the key elements in the system of interest and the hypothesized relationships between them. It is a diagram of proposed causal linkages among a set of concepts believed to be related to a particular world problem. A model in other words is an Integration of theories from multiple disciplines. Thus, a conceptual model is a visual representation of the elements of a theory and can be applied to other field to guide research and practice

- Cross-cutting issues: - Important issues to be considered but can be applied to several sectors such as environment, employment, private sector development, land, HIV/HAIDS, human institutional capacity, gender equity and community development, children and youth, disaster and relief management. Others are Information technology, communication, globalisation and trade development.

- Exploratory Research:-Research Design that has an objective of providing insights into and a comprehensive understanding of the problem situation confronting a researcher and the society.

- Extension Services:-Is the transfer of agricultural technology from an expert to farmer whereas experts include knowledgeable farmers themselves who are capable of educating their fellows.

- Food Security:-Is the condition in which all people at all times have enough food for healthy and productive life. It involves food availability, accessibility and utilisation.

- Information Technology (IT):-The science or practice of collecting, storing, using and sending information by means of computer systems and telecommunications

- Infrastructure: - Is the term delivered from military language of the Second World War (WW II) where it meant the permanent installations required for military operations. However, in the context of this study, agricultural infrastructure refers to all public services from law and order through education and public health. It also includes all means of transportation, communication, human skills, power and water supply, storage, irrigation and drainage system, and other physical facilities as well as agricultural overhead capital.

- Institutions: - Refers to organisations or bodies responsible for management,coordination, facilitating or providing any agricultural services to other organisations, groups or individual persons dealing with agribusiness at any level of the supply chain be it production, processing or marketing.

- Integrated Financial Management System: - A financial management system, which connects various government ministries, departments and agencies (MDAs) vide a dedicated network to a centralised data server at the Ministry of Finance (Treasury). Each MDA has its database such that whenever it makes transaction, the main server at the Treasury is updated immediately.

- Marketing:- Is the management function responsible for identifying, anticipating and satisfying customer requirement profitably. It is a set of techniques which address such matters as research, product design and development, pricing, packaging, sales and sales promotion, advertising, public relations, distribution and after-sales services. Thus, marketing is business activities associated with the flow of goods and services from production to consumption. In agriculture, marketing starts at the farm, with the planning of production to meet specific demands and market prospects. It is completed with the sale of the product to the consumer or to the manufacturer in the case of raw materials for industries.

- Marketing Channels: -Are trade or distribution entities. These are sets of interdependent organisations involved in the process of making a product or service available for use or consumption to the customer. These are bodies that stood between producers and final users and sometimes are called intermediaries who ensure the product flow from seller (producer) to the ultimate consumer.

- Model:- This is a structure that has been developed by an expert modeler to study the characteristics of a real-world problem. Formulation of a model by expert modelers involves capturing the problem descriptions, understanding the essential elements by studying structure, selecting a suitable tool with its underlying structure, and finally mapping the problem structure onto the tool structure.

- Non-Tradable Goods: -Are items or commodities whose prices are not well correlated with international prices even in the absence of policy distortions. They are typically not traded across international borders although small amounts might cross regional borders inland. Non-Tradable are commodities whose prices are set by local market forces of demand and supply.

- Non-traditional Export Crops: -Are those crops whose exports depend on the availability of surpluses. They are primarily for households' consumption.

- One License Rule:-A system whereby multiple license is not allowed. The system allows on license for only one activity in the coffee industry such as buying, processing, warehousing or export only. It is a temporally measure aimed at discouraging repossession of coffee at the auction and consequently depressing prices of coffee. It hampers quality and reputation of Tanzanian coffee at the world market. Thus it is there to arrest cartel tendencies.

- Parastatals: - Are state-owned organisations that are run on an autonomous or semi-autonomous basis in terms of their management with at least fifty percent government participation in their share capital.

- Peasant: -Farm households with access to their livelihood at hand, utilising mainly family labour during farm production (which is their main occupation) always located in a large economic system. They are characterised by hand to mouth way of living and partial engagement in market which tends to function with a high degree of imperfections.

- Poverty: A state of not being able to obtain (through purchase) the basic goods and services necessary to meet minimum standard of living.

- Production: In agriculture, production refers to processes of combining and co-ordinating inputs (resources or factors of production-land, labour, capital and entrepreneurship) in the creation of goods and services.

- Research Design:-Is a frame or blue print for conducting the research. It consists of detailed information about procedures necessary for obtaining data needed to structure or solve research problem. It specifies the details of implementing the research approach.

- Rural Areas: Villages, small towns and district centres where primary production takes place and where large populations are found. These areas are characterised by activities related to primary and secondary processing, marketing and services that serve rural and urban populations.

- Sample Frame: Is a list of target population members from which actually data is collected.

- Segmentation: Is the process within the marketing activities that identifies groups of buyers who posses similar characteristics. It comprises micro segmentation whereby the marketing mix management refines the groups of customers based on their decision-making similarities. It is an important component of a successful marketing mix management within the industrial settings.

- Strategy: Is the plan of action or path intended to use in order to achieve a particular set of objectives or a predetermined target. It is like tactic in the military sense. A strategy states set of activities to be performed, actors, resource requirement, when to start and complete as well as the expected output. Strategy also indicates measurable indicators for monitoring and evaluation purposes.

- Tradable Goods: Are items or commodities that can always be imported or exported in large quantities at the prevailing world market price. The world market determines their prices of these commodities.

- Traditional Export Crops: Are crops whose production objective is for export while a negligible amount is for domestic consumption.

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APPENDICES

Appendix I: Questionnaire for Leaders of Farmers' Associations

Dear respondent,

My name is Jasson Bennett Bagonza; I am conducting a research in collaboration with the School of Business Leadership (SBL) of the University of South Africa (UNISA) for fulfilment of requirement of studies leading to the award of Doctor of Business Leadership Degree (DBL). The aim is to examine the appropriateness of application of conceptual Supply Chain Management Model in Tanzanian agricultural sector (A case of Coffee in Kagera Region) in order to improve coffee production, processing and marketing and thus enhance incomes and living standards of the people.

Please take few minutes to answer questions designed on this form. Be assured that your answers will be kept confidential and used for academic purposes only and disclosure of your identity is optional.

1. What is level of your Education?

(a) Primary School [ ] (b) Secondary School [ ] (b) High School [ ]
(c) Certificate/Diploma [ ] (d) Bachelor Degree [ ] (e) Post Graduate/Professional [ ]

2. How do you assess the production pattern of coffee for the past fifteen years?

(a) Increasing [ ] (b) Decreasing [ ] (c) Constant [ ]

3. Please evaluate the behaviour and the status of the following services for production of coffee.

S/N	TYPE OF SERVICE	SERVICE PROVIDER		STATUS OF PROVISION OF SERVICE				
		GOV'T	PRIVATE	5	4	3	2	1
1	Inputs supply (eg. Fertilizers, Seeds, Insecticides)							
2	Extension Services							
3	Financial and Input credit facilities							
4	Early Warning Information/Weather							
5	Introduction of New Production Technology							
6	Inspection and Disease Control							
7	Dissemination of Improved Seeds							
6	Other – please specify							

Key: G'OVT-Co-operative Unions and other government organisations or agencies
5-Excellent 4-Good 3-Fair 2-Unsatisfactory 1-No service provided

4. What challenges are you facing (as farmers) in the course of production of coffee?

(a) Inadequate capital (b) Un Satisfactory extension services (c) 3-Inadequate supply of inputs
(d) Application of poor technology (e) Others – please specify_____

5. Please assess the agro-processing activities that exist for processing of coffee:

S/N	TYPE OF ACTIVITY	SERVICE PROVIDER		STATUS OF THE ACTIVITY				
		GOV'T	PRIVATE	5	4	3	2	1
1	Storage and fumigation of stores							
2	Quality Control, grading and specifications							
3	Packaging							
4	Technology of Processing							
5	Recycling							
6	Other – please specify							

KEY:

(b) 5-Excellent (b) 4-Good (c) 3-Satisfactory (d) 2-Un satisfactory (e) 1-No Activity

6 What do you consider to be the challenges facing coffee processing?
(a) Application of old and poor technology (b) Use of Un skilled labour (c) Lack of power supply
(d) Application of poor storage facilities (e) Others – please specify_____

7 How do you consider the price (cost) of inputs supplied to you by private and governmental organisations?

S/N	TYPE OF INPUT	SERVICE PROVIDER		PRICE/GENERAL COST OF INPUT				
		GOV'T	PRIVATE	5	4	3	2	1
1	Fertilizers							
2	Seeds							
3	Insecticides							
4	Input credit facilities (commercial & soft loans)							
5	Machinery (Tractors, Irrigation facilities etc)							
6	Other – please specify							

KEY: 5-Excellent (b) 4-Good (c) 3-Satisfactory (d) 2-High (e) 1-No service provided

8 How do the market channels (buyers) determine the price of coffee?
_____

9 What do you consider to be the effects of the price on coffee for the past ten years?
(a) Persistent decrease of production (b) Smuggling at the borders (c) Poverty among the people
(d) Low quality of coffee at the Market (e) Others – please specify_____

10 How do different institutions provide services in order to promote marketing of coffee?

S/N	TYPE OF SERVICE	SERVICE PROVIDER		STATUS OF PROVISION OF SERVICE				
		GOV'T	PRIVATE	5	4	3	2	1
1	Markets and Price Information							
2	Buying of Crop							
3	Transport Facilities (roads, water, air etc)							
4	Telecommunication							
5	Marketing Credit Facilities (financial & guarantee)							
6	Other – please specify							

Key:
(a) 5-Excellent (b) 4-Good (c) 3-Satisfactory (d) 2-Unsatisfactory (e) 1-No service provided

(11)What are constraints facing farmers as regards to marketing of coffee?
(a) Low price compared to world market (b) Poor infrastructure to the market (c) Sell of poor quality coffee (d) Lack of Market and price information (e) Others – please specify_____

(12) Do the government and other authorities applying Chain Management in co-ordinating activities related to coffee production, processing and marketing? YES [ ] NO [ ]

(13) What is your opinion regarding application of Chain Management in coffee production, processing and marketing?
_____

(14) Suggest strategies that can be applied to improve production behaviour, processing, and performance of institutions that provide services to coffee
_____
_____

THANK YOU FOR YOUR COOPERATION IN ANSWERING QUESTIONS

Appendix II: Questionnaire for Coffee Farmers Only

Dear respondent,
My name is Jasson Bennett Bagonza; I am conducting a research in collaboration with the School of Business Leadership (SBL) of the University of South Africa (UNISA) for fulfilment of requirement of studies leading to the award of Doctor of Business Leadership Degree (DBL). The aim is to examine the appropriateness of application of Conceptual Supply Chain Management Model in Tanzanian agricultural sector (A case of Coffee in Kagera Region) in order to improve coffee production, processing and marketing and thus enhance incomes and living standards of the people.

Please take few minutes to answer questions designed on this form. Be assured that your answers will be kept confidential and used for academic purposes only and disclosure of your identity is optional.

1.0 Respondent's Particulars
1.1 Name of Respondent_____
1.2 Age_____(Years)
1.3 Gender 1= Male [ ] 2= Female [ ]
1.4 Village_____
1.5 District_____
1.6 Education level_____
1.7 Family size _____(People)

2.0 Farming Behaviour
2.1 What is the size of your farm_____(Acres)
2.2 How many of these are cultivated_____(Acres)
2.3 How many acres are devoted for the coffee only _____(Acres)
2.4 Technology applied in cultivation;
1= Hand hoe [ ] 2= Animal traction [ ] 3= Tractor [ ]
2.5 What type of seeds do you grow
1= Traditional [ ] 2= Improved [ ] 3= Both [ ]

2.6 Indicate the pattern of production of reference crop for the last three years

Period	Size of the farm (acres)	Volume Produced (bags)	Volume Sold (bags)	Average Selling Price (Tshs)
Starting Year (2010)				
Current Year (2013)				

2.7 Indicate the type of production activity and the corresponding cost of hired labour use

Activity	No. People	Hrs/Day(s)	Wage
Farm clearing			
Planting			
Weeding			
Pruning			
Agrochemicals Application			

2.8 Indicate production input applied, quantity purchased and their cost for the total area

Type of input	Units	Quantity	Cost of input (Tshs)
Tractor			
Animal			
Planting materials			
Seeds			

Weeding tools			
Insecticide			
Fertilisers			

2.9 What problems do you always face in the course of cultivation?

1= No on-farm training [ ] 2= Dependence on rain-fed cultivation [ ]
3= Diseases and pests [ ] 4= No research results [ ] 5= Lack of credits [ ]
6= Others (specify) _____

3.0 Agricultural services rendered by Institutions

3.1 Do you receive extension services from responsible Institutions? 1= YES [ ] 2= NO [ ]

3.2 How many times (per season) do extension officers visit your farm?
1= NONE [ ] 2= 1 – 2 [ ] 3= 3 – 5 [ ] 4= above 5 [ ]

3.3 Do you apply and receive credit facility for farming activities? 1= YES [ ] 2= NO [ ]

3.4 If the answer is YES, what kind of credit facility did you receive?
1= Cash short-term [ ] 2= Cash long-term Loan [ ] 3= Input credit [ ]

3.5 Indicate the amount of credit extended to you _____(Tshs)

3.6 How much interest rate paid? _____%

3.7 Indicate other agricultural services rendered to you
1= Early warning information [ ] 2= Disease and pest control [ ] 3= Input supply [ ]
4= New production technology [ ] 5= dissemination of improved seeds [ ]

Processing and Handling Services

4.1 What kind of technology do you apply for harvesting?
1= Labour of family members [ ]2= Hired labour [ ] 3= harvester machine [ ]

4.2 Which method is applied to dry the harvested crops?
1= spread on wire mesh [ ] 2= spreading on earthen patios [ ]
3= spread on drying mats [ ]

4.3 How the harvests are transported from farm to homestead?
1= by animal cats [ ] 2= by human labour [ ] 3= by trucks [ ]
4= Others - please specify _____

4.4 Indicate the processing input applied, quantity purchased and their costs for the total area

Type of input	Units	Quantity	Cost of input (Tshs)
Harvesting tools			
Drying tools			
Shelling machine			
Pesticide			
Storage			
Packaging materials			

4.5 Indicate the costs incurred for processing and handling activities

Activity	Family Labour (m/hr)			Hired Labour (m/hr)			
	No. of People	Hrs/day	Days	No. of People	Hrs/Day	Days	Wage
Harvesting							
Transportation							
Shelling/winnowing							
Pulping/hulling/curing							
Packaging							
Storing							

4.6 What is the source of agrochemicals you apply?
1= Specialised agent [ ] 2= Private shops [ ] 3= Extension agent [ ]
4= Others - please specify _____

4.7 Do you get advice from any authority/ institution regarding processing and handling of the coffee?
1= YES [ ] 2= NO [ ]

4.8 What are the major problems you are facing regarding processing
1= Lack of credit services [ ] 2= Lack of technical skills [ ] 3= No power supply [ ]
4= Poor institutional arrangement [ ] 5=Low level of awareness [ ]
6= Others - please specify _____

4.9 Indicate problems you always face in the course of processing?

1=Lack of capital due to poor financing services [ ]
2=Absence of power supply in rural areas [ ]
3=reluctance of government to spearhead value adding [ ]
4=Inadequate personnel with technical skills in agro-processing [ ]
5= Others – please specify_____

5.0 Marketing of Coffee

5.1 Have you been selling Coffee for the past three years? 1= YES [ ] 2= NO [ ]

5.2 Did you know where to sell your Coffee? 1= YES [ ] 2= NO [ ]

5.3 Mention the marketing channel that has been buying your Coffee
1= Private traders [ ] 2= Middle men [ ] 3= Co-operative Union [ ]
4= Others – please specify_____

5.4 How do you get information about prices of your Coffee
1= Direct at the market place [ ] 2= From the middlemen and traders [ ]
3= Media communication [ ] 4= Friends [ ]
5= Others – please specify_____

5.5 Why do you always accept the price offered to your coffee?
1= Need of cash [ ] 2= good price [ ] 3= I respect agreement with buyer [ ]
4= Fear of price fluctuation and decline of quality [ ]
5= Others –please specify _____

5.6 Are you motivated for cultivation of this crop in the next season? 1= YES [ ] 2= NO [ ]

5.7 If YES or NO, give the reasons for your answer _____

_____

5.8 Indicate the type of marketing activity and the corresponding cost of labour use

Activity	Family Labour (m/hr)			Hired Labour (m/hr)			
	No. People	Hrs/day	Days	No. People	Hrs/Day	Days	Wage
Buying of crop							
Transportation							
Storing							
Packaging materials (sisal bags)							
Information dissemination							

5.9 What problems do you always face in the course of coffee marketing?

1= Lack of information regarding markets and price [ ]
2= Poor marketing infrastructure (stores, roads, railways, telecomm etc) [ ]
3= Lack of capital due to poor financing services [ ]
4= Low prices for crops/ lack of farmers participation in determination of prices [ ]
5= Poor quality of marketed products (primary or un processed) [ ]
6= Others – please specify _____

6.0 General Information

6.1 Indicate the items that you have been able to buy using the income from your coffee

1= Radio [ ] 2= Ox Plough [ ] 3= Ox-cart [ ] 4= Car [ ]
5= Motorcycle [ ] 6= Bicycle [ ] 7= Tractor [ ] 8= TV [ ]
9= School fees [ ] 10= House (made by bricks and iron sheet) [ ]

6.2 Are you a member of any farmers' group 1= YES [ ] 2= NO [ ]

6.3 Which constraints do you consider to be more pressing in the whole Supply chain of coffee?
1= Production problems at farm level [ ]
2= Those associated with processing of coffee [ ]
3= Marketing constraints especially during selling [ ]
4=Others – please specify_____

6.4 Please, suggest strategies for alleviating the existing challenges along the coffee supply chain

_____

_____

6.5 Below is a list of activities and services along the agricultural supply chain. Please indicate all those you always participate in their execution or operation;

S/N	Supply Chain Management Activity	Participation (1= YES; 2= NO)
1	Inputs use (eg. Fertilizers, Seeds, Insecticides etc)	
2	Research and development	
3	Extension services	
4	Preparation of improved seeds	
5	Early warning information/weather	
6	Training to farmers	
7	Introduction of new production technology	
8	Inspection and disease/pest control	
9	Provision of financial and input credit facilities	
10	Harvesting	
11	Storage and fumigation of stores	
12	Transportation and handling of products	
13	Milling/Hulling	
14	Quality Control, grading and specifications	
15	Packaging Services	
16	Processing	
17	Recycling of wastes	
18	Development of Markets	
19	Price discovery	
20	Transportation Facilities (roads, water, air etc)	
21	Telecommunication	
22	Sourcing Credit (financial & letter of credit)	

Thank you for your understanding and co-operation

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Appendix III: Interview Guide for Coffee Management Institutions

Research Title: An appropriate Conceptual Supply Chain Management Model in Agricultural Sector in Tanzania: A case of Coffee in Kagera Region.

Researcher: BAGONZA Jasson Bennett

A. Introduction

The general objective of the study is to assess application of Conceptual Supply Chain Management Model in order to improve agricultural sector production and productivity in Tanzania so as to enhance the income of the rural poor as well as improve the standard of living of the people. This is an academic research for the award of Doctoral Degree in Business Leadership (DBL) at the School of Business Leadership (SBL) of the University of South Africa (UNISA).

SCM is the leadership style that co-ordinates a network of firms interacting to deliver a product or service to the end consumer, linking flows from raw material supply to final delivery. This is from the point of view that a product is created by a set of activities with precedence relations between them executed and directed within the supply chain. This study aims at assessing the behaviour, process and institutions coordinating coffee production, processing and marketing in Kagera region. Please take few minutes to discuss and answer questions designed for you. Be assured that your answers will be kept confidential and used for academic purposes only.

B. Questions

1. COFFEE PRODUCTION IN KAGERA REGION – PRODUCERS

i. Are coffee production activities well integrated with other agricultural activities?
ii. Mention the areas where you think the chain management is not applied to co-ordinate all agricultural activities.
iii. Is the coffee production pattern of decreasing, constant or increasing nature?
iv. What system is being applied in coffee production between Large and small-scale systems?
v. Do you sell all the amount of coffee produced at the market or there is post-harvest loss?
vi. Is the trend of post-harvest loss decreasing, constant or increasing?
vii. How do the government and other organisations support coffee production in terms of the following: -
    a) Research and Development
    b) Extension services or advisory services
    c) Diseases and pests control
    d) Introduction and dissemination of improved packages and seeds
viii. Do you receive any credit facilities from financial institutions for coffee production purposes?
ix. What are the conditions attached to credits such as interest rates, collateral and repayment schedule?
x. On your own opinion, what factors do you think affect Coffee production?
xi. What should be done to minimise or mitigate the effects of the existing Coffee production?

2. COFFEE PROCESSING IN KAGERA REGION- PROCESSORS

i. What problems do farmers and processors encounter during the processing of Coffee?
ii. Are there adequate Coffee transport, handling, and storing facilities for farmers?
iii. Are there adequate and reliable processing facilities including plants or factories?
iv. Is there modern technology applied for processing of coffee? Is it capital or labour intensive technology?
v. How the quality of Coffee is controlled in order safeguard the interest of the consumers?
vi. How grading and specifications take place in order to create and maintain demand of Coffee?
vii. What measures are taken to ensure good Coffee packaging and branding?
viii. Do processors, and other stakeholders invest on training in order to ensure quality agro-processing?
ix. Is the type of processing technology applied environmental friendly?
x. Is there any recycling process of wastes to avoid environmental destruction and pollution?
xi. Do you see any application of SCM in linking agro-processing along the whole coffee supply chain?
xii. Mention the weakness you observe as regards to application of SCM in Coffee processing.
xiii. Please suggest strategies that would be employed in order to improve processing of coffee in Kagera region.

3. COFFEE MARKETING IN KAGERA REGION-MARKETING INSTITUTIONS

i. How do the marketing Institutions provide price information and determine the prices of the Coffee?
ii. Are the farmers involved or represented in the process of price determination?
iii. How the price has been affecting the trend of Coffee production for the past ten years?
iv. How financial institutions support marketing services (e.g. loans, letter of credit, guarantee etc)?
v. How the government is improving infrastructure (telecomm and Transport) to support Coffee marketing?
vi. Is coffee production, processing and marketing using modern equipment for quality coffee export?
vii. Do you see the need of existence of both co-operative unions and crop marketing boards?
viii. What are problems facing the co-operative unions and crop marketing boards in Tanzania?
ix. What do you suggest in order to revive the operations of co-operative unions and crop marketing boards?
x. How do you assess the participation of private sector in marketing of coffee?
xi. How do you assess the trend of volume of export for coffee for the past ten years?
xii. Is marketing aspects linked together with other crop services to form a complete supply chain of activities?
xiii. Do you think application of Supply Chain Management can be a solution for current marketing problems?
xiv. From your own opinion, suggest any new ideas on how to improve SCM and improve marketing of coffee.

THANK YOU FOR YOUR COOPERATION

Appendix IV: Interview Guide for Workers in the Government Ministries

Research Title: An appropriate Supply Chain Management Model in Agricultural Sector in Tanzania: A case of Coffee in Kagera Region.

Researcher: BAGONZA Jasson Bennett

A. Introduction

The general objective of the study is to assess application of Supply Chain Management Model in order to improve agricultural sector production and productivity in Tanzania so as to enhance the income of the rural poor as well as improve the standard of living of the people. This is an academic research for the award of Doctoral Degree in Business Leadership (DBL) at the School of Business Leadership (SBL) of the University of South Africa (UNISA).

SCM co-ordinates a network of firms interacting to deliver a product or service to the end customer, linking flows from raw material supply to final delivery. It is the leadership style of linkages among the actors. This is from the point of view that a product is created by a set of activities with precedence relations between them executed and directed within the supply chain. This study aims at assessing the behaviour, process and institutions coordinating coffee production, processing and marketing in Kagera region. Please take few minutes to discuss with you and answer questions designed for you. Be assured that your answers will be kept confidential and used for academic purposes only.

B. Questions

1 Do the government and other authorities applying appropriate SCM in co-ordinating activities related to coffee production, processing and marketing?

2 If the answer is YES how SCM is applied? But if the answer is NO why is it not applied in Coffee industry?

3 How do the government and other organisations support production in terms of the following: -

   i. Conducting and dissemination of results of research and development
   ii. Input supply (Fertilisers, machinery, seeds etc)
   iii. Provision of extension and or advisory services
   iv. Supply of diseases and pests control facilities
   v. Introduction and dissemination of improved packages and seeds
   vi. Introduction of new production technologies
   vii. Provision of facilities for Irrigation system

4 What problems do farmers and processors encounter during the processing of Coffee?

5 How do you assess the level of technology being applied for processing of coffee?

6 Is there appropriate application of SCM in co-coordinating agro-processing along the whole supply chain of coffee supply chain?

7 How do the marketing channels (Institutions) determine the prices of coffee?

8 Are the coffee farmers participating in the whole process of Coffee price determination?

9 From your own opinion, is marketing aspect linked to other agricultural services to form a complete supply chain?

10 Can appropriate application of SCM form part of the solution of existing coffee marketing problems?

11 Occasionally, farmers and traders attempt to sell coffee across borders. Can this be a market solution for increasing coffee production in Kagera region?

12 It is said that co-operative unions and Coffee Board are inefficient. What are problems facing these organisations?

13 From your own opinion, propose strategies that could be applied to solve the existing challenges and improve production, processing, and marketing services of coffee in Kagera.

THANK YOU FOR YOUR COOPERATION

Appendix V: – Research Analysis Results

1. Production Pattern of Coffee for the past fifteen years

Crop	Production Pattern of coffee for the past fifteen years			
	Increasing	Decreasing	Constant	Total
Coffee	24 (15.0)	101 (63.0)	35 (22.0)	160 (100.0)
TOTAL	37 (14.0)	166 (62.0)	67 (25.0)	270 (100.0)

2. Analysis of Agricultural Services Rendered by Institutions

Crop	Extension Services	Credit Facilities	Early Warning Information	Disease & Pest Control	Input Supply	New Prod. Technology	Dissemination of Seeds
Coffee	29 (43.0)	10 (15.0)	26 (38.0)	40 (59.0)	36 (53.0)	26 (38.0)	44 (65.0)

3. Type of seed grown Vs Technology Applied in Cultivation

Crop	Seeds Grown	Hand Hoe	Animal Traction	Tractor
Coffee	Traditional	49 (74.0)	3 (43.0)	2 (50.0)
	Improved	7 (11.0)	2 (29.0)	-
	Both types	10 (15.0)	2 (29.0	2 (50.0)
	Total	66 (100.0)	7 (100.0)	4 (100.0)

4. Pattern of Production Vs Technology Applied in Production

Crop	Trend of Production	Technology Applied in Production of the Crop		
		Hand Hoe	Animal Traction	Tractor
Coffee	Decreased	40 (61.0)	6 (86.0)	4 (100.0)
	Constant	3 (5.0)	0 (0.0)	0 (0.0)
	Increased	23 (35.0)	1(14.0)	0 (0.0)
	Total	66 (100.0)	7 (100.0)	4 (100.0)

5. Pattern of Production Vs Types of seeds Grown

Crop	Trend of Production	Type of Seeds Grown by Farmers			
		Traditional	Improved	Both Types	Total
Coffee	Decreased	30 (59.0)	6 (86.0)	6 (60.0)	42 (62.0)
	Constant	3 (6.0)	0 (0.0)	0 (0.0)	3 (4.0)
	Increased	18 (35.0)	1 (14.0)	4 (40.0)	23 (34.0)
	Total	51 (100.0)	7 (100.0)	10 (100.0)	68 (100.0)

6. Pattern of Production Vs Provision of Extension Services

Crop	Trend of Production	Frequency of Provision of Extension Services per Season				
		None	1-2	3-5	Above 5	Total
Coffee	Decreased	25 (60.0)	13 (31.0)	3 (7.0)	1 (2.0)	42 (100.0)
	Constant	3 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (100.0)
	Increased	12 (52.0)	10 (44.0)	0 (0.0)	1 (4.0)	23 (100.0)
	Total	40 (59.0)	23 (34.0)	3 (4.0)	1 (3.0)	68 (100.0)

7. Technology applied in Production Vs Provision of Extension Services

Crop	Ext. Services per season	Hand Hoe	Animal Traction	Tractor
Coffee	None	39 (59.0)	4 (57.0)	3 (75.0)
	1-2	22 (33.0)	1 (14.0)	1 (25.0)
	3-5	3 (5.0)	2 (29.0)	0 (0.0)
	Above 5	2 (3.0)	0 (0.0)	0 (0.0)
	Total	66 (100.0)	7 (100.0)	4 (100.0)

8. Technology Applied in Production Vs Total Household Farm Size

Crop	Land Holding (Acres)	Technology Applied in Crop Cultivation		
		Hand Hoe	Animal Traction	Tractor
Coffee	0.5-3.9	30 (45.0)	2 (29.0)	0 (0.0)
	4.0-6.9	14 (21.0)	0 (0.0)	2 (50.0)
	7.0-9.9	11 (17.0)	2 (29.0)	0 (0.0)
	10.0-12.9	7 (11.0)	1 (14.0)	0 (0.0)
	13.0-19.9	2 (3.0)	1 (14.0)	1 (25.0)
	20.0 and Above	2 (3.0)	1 (14.0)	1 (25.0)
	Total	66 (100)	7 (100)	4 (100)

9. Technology Applied in Production Vs Total Cultivated Land

Crop	Land Holding (Acres)	Technology Applied in Crop Cultivation		
		Hand Hoe	Animal Traction	Tractor
Coffee	0.5-3.9	30 (46.0)	2 (29.0)	0 (0.0)
	4.0-6.9	18 (27.0)	0 (0.0)	2 (50.0)
	7.0-9.9	10 (15.0)	3 (43.0)	0 (0.0)
	10.0-12.9	5 (8.0)	0 (0.0)	0 (0.0)
	13.0-19.9	1 (2.0)	1 (14.0)	1 (25.0)
	20.0 and Above	2 (3.0)	1 (14.0)	1 (25.0)
	Total	66 (100.0)	7 (100.0)	4 (100.0)

10. Technology Applied in Production Vs Total land Devoted for Coffee

Crop	Land Holding (Acres)	Technology Applied in Crop Cultivation		
		Hand Hoe	Animal Traction	Tractor
Coffee	0.5-3.9	50 (75.0)	4 (57.0)	1 (25.0)
	4.0-6.9	12 (18.0)	2 (29.0)	2 (50.0)
	7.0-9.9	2 (3.0)	0 (0.0)	0 (0.0)
	10.0-12.9	1 (2.0)	0 (0.0)	0 (0.0)
	13.0-19.9	-	1 (14.0)	-
	20.0 and Above	1(2.0)	-	1 (25.0)
	Total	66 (100.0)	7 (100.0)	4 (100.0)

11. Categories of Land Holding (Acreage) for each Farmer

Categories of farm sizes (Acres)	Total Land	Cultivated	Coffee Farm only
0.5-3.9	30 (44.0)	30 (44.0)	51 (75.0)
4.0-6.9	16 (24.0)	20 (29.0)	13 (19.0)
7.0-9.9	11 (16.0)	10 (15.0)	2 (3.0)
10.0-12.9	7 (10.0)	5 (7.0)	1 (2.0)
13.0-19.9	2 (3.0)	1 (2.0)	1(2.0)
20.0 and above	2 (3.0)	2 (3.0)	-
Total	68 (100.0)	68 (100.0)	68 (100.0)

12. Partial Budget on the Supply Chain of Coffee-Averages

S/N	Item	Units	Amount
	Total Sample	People	155
a	Household Cultivated	Hectares	3.4
b	Total output from (a)	Kgs	865.0
c	Producer Price	Shs/Kg	1,135.65
d	Revenue	Tshs	982,337.25
e	Total Variable Costs along the SC:		
	a) Production Stage	Tshs	269,855.10
	) Chemical Fertilizers	TShs	78,731.50
	) Pesticides	TShs	54,170.70
	) Other Inputs	TShs	97,450.70
	) Hired Labour	TShs	39,502.20
	b) Processing Stage	TShs	95,367.35
	) Pesticides	TShs	-
	) Other Inputs	TShs	77,040.10
	) Hired Labour	TShs	18,327.25
	c) Marketing Stage	TShs	4,833.30
	) Hired Labour	TShs	4,833.30
f	Total Variable Costs (a) to (i)	TShs	370,055.75
g	Gross margin (d-f)	TShs	612,281.5

13. Workers and Farmers Evaluation of Production Pattern of coffee for the past fifteen years

PATTERN OF PRODUCTION	WORKERS		FARMERS	
	Counts	Percent	Counts	Percent
Increasing	35	14.6	37	13.7
Decreasing	137	57.1	166	61.5
Constant	68	28.3	67	24.8
Total	240	100.0	270	100.0

Source: Survey Results, (2014)

14. Farmers and Workers Assessment on Coffee Production Services

Production Activity	FARMERS				WORKERS			
	Inadequate		Adequate		Inadequate		Adequate	
	Counts	Percent	Counts	Percent	Counts	Percent	Counts	Percent
Inputs supply	142	52.6	128	47.4	128	53.3	112	46.7
Research and Development	87	32.2	183	67.8	103	42.9	137	57.1
Extension Services	186	68.9	84	31.1	138	57.5	102	42.5
Training to farmers & Ext staff	142	52.6	128	47.4	109	45.4	131	54.6
Financial credit facilities	246	91.1	24	8.9	196	81.7	44	18.3
Early Warning Info/Weather	199	73.7	71	26.3	100	41.7	140	58.3
Introduction of New Prod Tech	191	70.7	79	29.3	82	34.2	158	65.8
Pests and Disease Control	145	53.7	125	46.3	100	41.7	139	57.9
Dissemination of improved Seeds	77	28.5	193	71.5	74	30.8	166	69.2

Source: Survey Results, (2014)

15. Processors and Workers Evaluation on Execution of Coffee processing Activities

Production Activity	PROCESSORS				WORKERS			
	Inadequate		Adequate		Inadequate		Adequate	
	Counts	Percent	Counts	Percent	Counts	Percent	Counts	Percent
Storage and fumigation	81	32.4	169	67.6	137	57.1	103	42.9
Quality control and grading	96	38.4	154	61.6	162	67.5	78	32.5
Technology of processing	100	40.0	150	60.0	101	42.1	139	57.9
Packaging	50	20.0	200	80.0	138	57.5	102	42.5
Recycling of products	137	54.8	113	45.2	135	56.3	105	43.8

Source: Author's computation from survey Results, (2014)

16. Marketers and Farmers Evaluation on Execution of Coffee Marketing Activities

Production Activity	MARKETERS				FARMERS			
	Inadequate		Adequate		Inadequate		Adequate	
	Counts	Percent	Counts	Percent	Counts	Percent	Counts	Percent
Markets and price information	125	54.2	105	45.8	154	57.0	116	43.0
Marketing credit facilities	89	38.7	141	61.3	237	87.8	33	11.2
Buying of crops	144	62.5	86	37.5	100	37.1	170	62.9
Transport facilities	107	46.7	123	53.3	105	38.9	165	61.1
Telecommunication	131	57.1	99	42.9	172	63.7	98	36.3

17. Price Determination by Marketing Institutions and Its Effects

Market channels determining prices	Effects of the prices					
	Smuggling at borders	Rural-urban migration	Poor quality crops	Persistent poverty	Collapse of co-operatives	Total
Buyers Only	26 (61.0)	3 (7.0)	9 (21.0)	2 (5.0)	3 (7.0)	43 (100.0)
Govt through co-operatives	11 (65.0)	1 (6.0)	1 (6.0)	2 (12.0)	2 (12.0)	17 (100.0)
World Market	13 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	13 (100.0)
Total	50 (67.0)	4 (6.0)	10 (14.0)	4 (6.0)	5 (7.0)	73 (100.0)

18. Challenges facing Coffee Marketing Institutions

Constraints	**YES**	**NO**
Weak capital base due to poor financial services	37 (54.0)	31 (46.0)
Lack of price information	56 (82.0)	12 (18.0)
Lack of farmers participation in price determination	60 (88.0)	8 (12.0)
Buying of poor (semi or unprocessed) products	52 (77.0)	16 (24.0)
Poor marketing infrastructure	38 (56.0)	30 (44.0)

19. Evaluation of Application of Supply Chain Management in Coffee Management

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
YES	73	27.0	27.0	27.0
NO	197	73.0	73.0	73.0
TOTAL	270	100.0	100.0	

20. Analysis on Coffee Price Determination

Crop	**Mode by which market channels Determine Prices of Coffee**			
	Prices are set by buyers	Prices are set by Govt through Tanzania Coffee Board	Prices are set by World Market	Total
Coffee	99 (62.0)	35 (22)	25 (16.0)	159 (100.0)

21. Stakeholders' Participation in Management of the Coffee Supply Chain

Supply Chain Activity/Service	Counts & percentage
Inputs Supply and Use	36 (53.0)
Research and Development	7 (10.0)
Extension Services	33 (49.0)
Preparation of Improved seeds	19 (28.0)
Early warning Information	10 (15.0)
Training to Farmers and Extension staff	27 (40.0)
Introduction of new production technology	25 (37.0)
Inspection and disease/pest control	47 (69.0)
Financial and input credit facilities	6 (9.0)
Harvesting	45 (66.0)
Storage and fumigation of stores	37 (54.0)
Transportation and handling of products	53 (78.0)
Milling/Hulling	3 (4.0)
Quality control, grading and specifications	50 (74.0)
Packaging Services	52 (77.0)
Processing	54 (79.0)
Recycling of wastes	53 (78.8)
Development of Markets	2 (3.0)
Price determination	3 (4.0)
Infrastructure development	14 (21.0)
Telecommunication	3 (4.0)
Sourcing credit (loans & letter of credit)	3 (4.0)

22. Evaluation of the inputs supply for coffee Vs Education level of respondents

		Education level of respondents					Total
		Primary School	Secondary School	Certificate or Diploma	Bachelor Degree	Post Graduate	
No service provided	Respondents	19	6	11	2	0	38
	% of total	7.0%	2.2%	4.1%	0.7%	0.0%	14.1%
Un satisfactory	Respondents	60	36	2	4	2	104
	% of total	22.2%	13.3%	0.7%	1.5%	0.7%	38.5%
Fair	Respondents	49	20	20	0	4	93
	% of total	18.1%	7.4%	7.4%	0.0%	1.5%	34.4%
Good	Respondents	18	10	5	2	0	35
	% of total	6.7%	3.7%	1.9%	0.7%	0.0%	13.0%
Total	Respondents	**146**	**72**	**38**	**8**	**6**	**270**
	% of Total	**54.1%**	**26.7%**	**14.1%**	**3.0%**	**2.2%**	**100.0%**

23. Evaluation of the extension services Vs Education level of respondents

		Education level of respondents					Total
		Primary School	Secondary School	Certificate or Diploma	Bachelor Degree	Post Graduate	
No service provided	Respondents	34	18	11	0	0	63
	% of total	12.6%	6.7%	4.1%	0.0%	0.0%	23.3%
Un satisfactory	Respondents	76	24	17	2	4	123
	% of total	28.1%	8.9%	6.3%	0.7%	1.5%	45.6%
Fair	Respondents	32	28	8	6	2	76
	% of total	11.9%	10.4%	3.0%	2.2%	0.7%	28.1%
Good	Respondents	4	2	2	0	0	8
	% of total	1.5%	0.7%	0.7%	0.0%	0.0%	3.0%
Total	Respondents	**146**	**72**	**38**	**8**	**6**	**270**
	% of Total	**54.1%**	**26.7%**	**14.1%**	**3.0%**	**2.2%**	**100.0%**

24. Evaluation of the Credit Facilities for coffee Vs Education level of Respondents

		Education level of respondents					Total
		Primary School	Secondary School	Certificate or Diploma	Bachelor Degree	Post Graduate	
No service provided	Respondents	78	43	14	4	2	141
	% of total	28.9%	15.9%	5.2%	1.5%	0.7%	52.2%
Un satisfactory	Respondents	60	21	18	4	2	105
	% of total	22.2%	7.8%	6.7%	1.5%	0.7%	38.9%
Fair	Respondents	8	8	4	0	2	22
	% of total	3.0%	3.0%	1.5%	0.0%	0.7%	8.1%
Good	Respondents	0	0	2	0	0	2
	% of total	0.0%	0.0%	0.7%	0.0%	0.0%	0.7%
Total	Respondents	**146**	**72**	**38**	**8**	**6**	**270**
	% of Total	**54.1%**	**26.7%**	**14.1%**	**3.0%**	**2.2%**	**100.0%**

25. Evaluation of the of Early Warning Information Vs Education level of Respondents

		Education level of respondents					Total
		Primary School	Secondary School	Certificate or Diploma	Bachelor Degree	Post Graduate	
No service provided	Respondents	46	19	8	2	2	77
	% of total	17.0%	7.0%	3.0%	0.7%	0.7%	28.5%
Un satisfactory	Respondents	66	35	15	6	0	122
	% of total	24.4%	13.0%	5.6%	2.2%	0.0%	45.2%
Fair	Respondents	25	14	4	0	4	47
	% of total	9.3%	5.2%	1.5%	0.0%	1.5%	17.4%
Good	Respondents	9	4	9	0	0	22
	% of total	3.3%	1.5%	3.3%	0.0%	0.0%	8.1%
Excellent	Respondents	0	0	2	0	0	2
	% of total	0.0%	0.0%	0.7%	0.0%	0.0%	0.7%
Total	Respondents	**146**	**72**	**38**	**8**	**6**	**270**
	% of Total	**54.1%**	**26.7%**	**14.1%**	**3.0%**	**2.2%**	**100.0%**

26. Evaluation of Production Technology Vs Education Level of Respondents

		Education level of respondents					**Total**
		Primary School	**Secondary School**	**Certificate or Diploma**	**Bachelor Degree**	**Post Graduate**	
No service provided	Respondents	31	16	2	2	0	51
	% of total	11.5%	5.9%	0.7%	0.7%	0.0%	18.9%
Un satisfactory	Respondents	69	39	20	6	6	140
	% of total	25.6%	14.4%	7.4%	2.2%	2.2%	51.9%
Fair	Respondents	46	11	14	0	0	71
	% of total	17.0%	4.1%	5.2%	0.0%	0.0%	26.3%
Good	Respondents	0	6	2	0	0	8
	% of total	0.0%	2.2%	0.7%	0.0%	0.0%	3.0%
Total	**Respondents**	**146**	**72**	**38**	**8**	**6**	**270**
	% of Total	**54.1%**	**26.7%**	**14.1%**	**3.0%**	**2.2%**	**100.0%**

27. Evaluation of Inspection and Disease Control Vs Education Level of Respondents

		Education level of respondents					**Total**
		Primary School	**Secondary School**	**Certificate or Diploma**	**Bachelor Degree**	**Post Graduate**	
No service provided	Respondents	23	6	8	2	2	41
	% of total	8.5%	2.2%	3.0%	0.7%	0.7%	15.2%
Un satisfactory	Respondents	61	28	7	6	2	104
	% of total	22.6%	10.4%	2.6%	2.2%	0.7%	38.5%
Fair	Respondents	56	35	21	0	0	112
	% of total	20.7%	13.0%	7.8%	0.0%	0.0%	41.5%
Good	Respondents	6	3	2	0	2	13
	% of total	2.2%	1.1%	0.7%	0.0%	0.7%	4.8%
Total	Respondents	**146**	**72**	**38**	**8**	**6**	**270**
	% of Total	**54.1%**	**26.7%**	**14.1%**	**3.0%**	**2.2%**	**100.0%**

28. Evaluation of Dissemination of Improved Seeds Vs Education Level of Respondents

		Education level of respondents					Total
		Primary School	Secondary School	Certificate or Diploma	Bachelor Degree	Post Graduate	
No service provided	Respondents	2	0	0	0	0	2
	% of total	0.7%	0.0%	0.0%	0.0%	0.0%	0.7%
Un satisfactory	Respondents	49	17	5	2	2	75
	% of total	18.1%	6.3%	1.9%	0.7%	0.7%	27.8%
Fair	Respondents	78	37	27	4	2	148
	% of total	28.9%	13.7%	10.0%	1.5%	0.7%	54.8%
Good	Respondents	15	18	6	2	2	43
	% of total	5.6%	6.7%	2.2%	0.7%	0.7%	15.9%
Excellent	Respondents	2	0	0	0	0	2
	% of total	0.7%	0.0%	0.0%	0.0%	0.0%	0.7%
Total	Respondents	**146**	**72**	**38**	**8**	**6**	**270**
	% of Total	**54.1%**	**26.7%**	**14.1%**	**3.0%**	**2.2%**	**100.0%**